THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXI. No. 770.] LONDON, FEBRUARY 12, 1878. [30th Year.] Price 6d.

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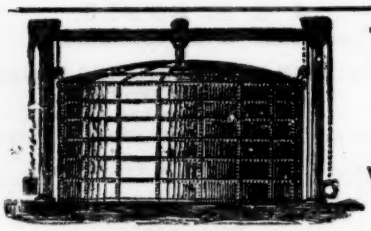

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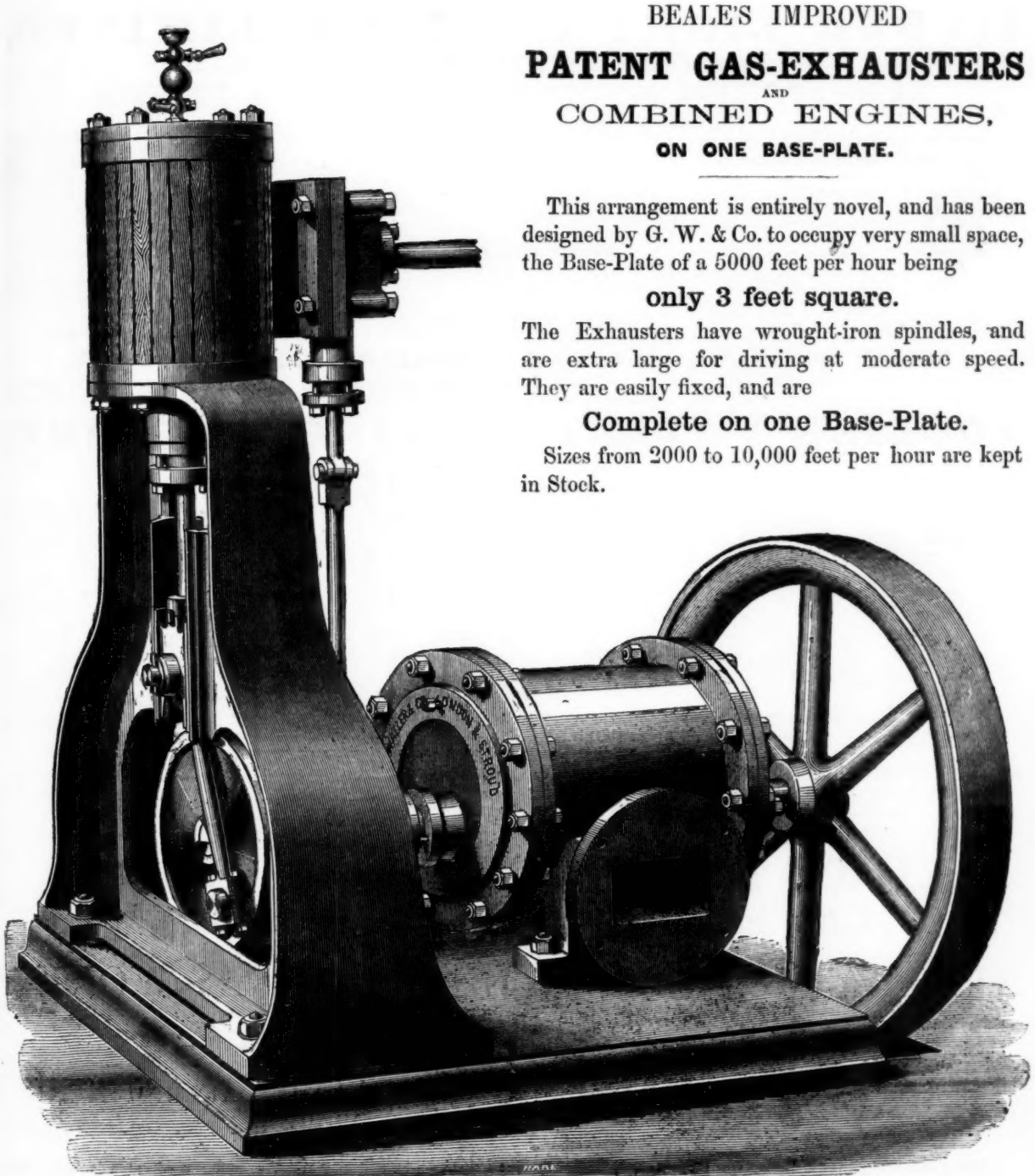

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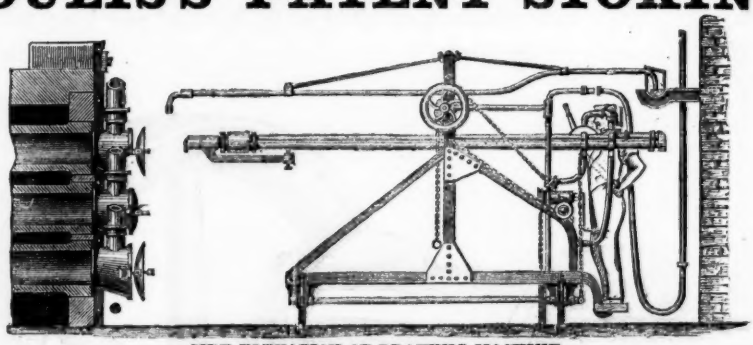
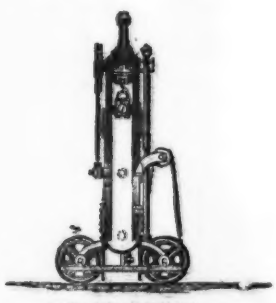


SIDE ELEVATION OF DRAWING MACHINE.



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(The Charging Machine will be Illustrated in next week's Advertisement.)

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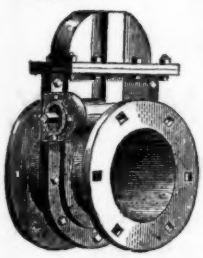

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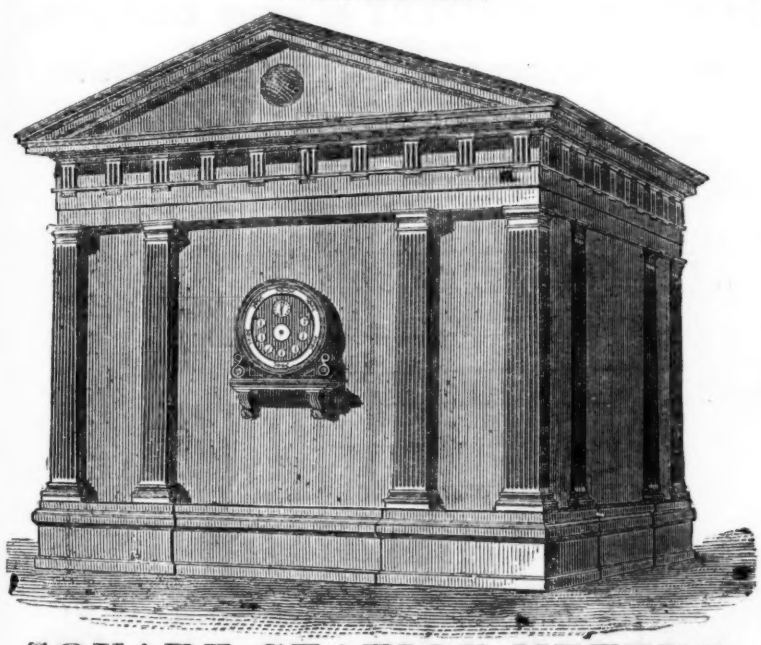

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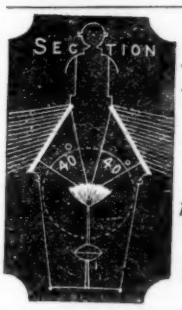

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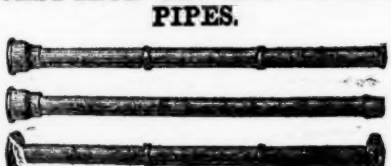
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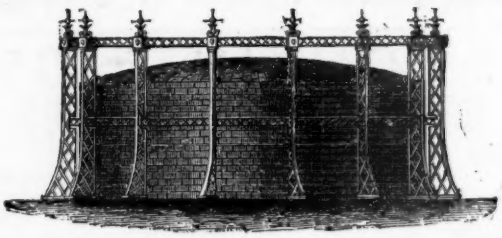
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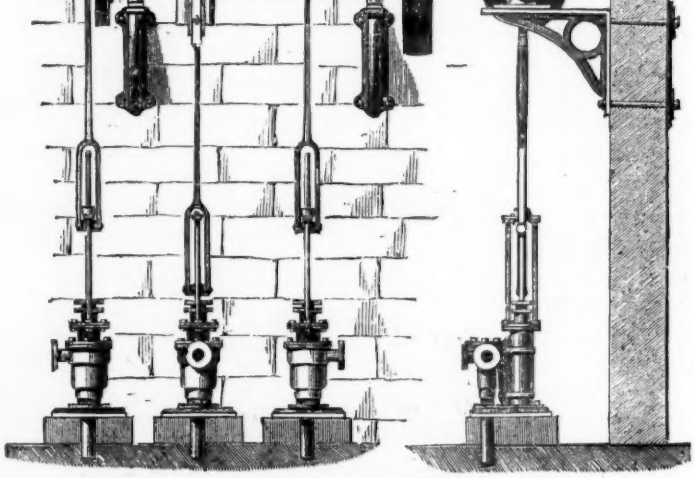

IMPROVED DOUBLE-ACTION PUMPS.
For Water. For Tar. For Ammoniacal Liquor.
This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction.
These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.
GAS SYPHON PUMPS, IN COPPER OR SHEET IRON, ALWAYS IN STOCK.
Illustrated Catalogues sent post free on application.

TANGYE BROTHERS AND HOLMAN,

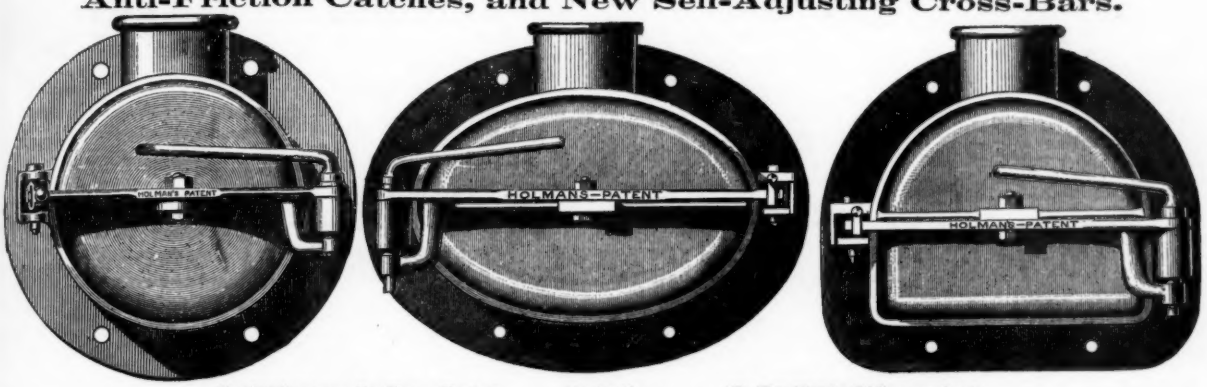
CORNWALL HOUSE, 35, VICTORIA ST., LONDON, E.C.

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

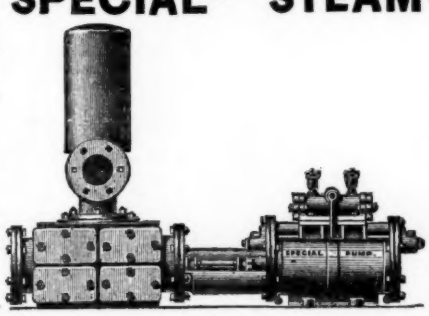
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS
HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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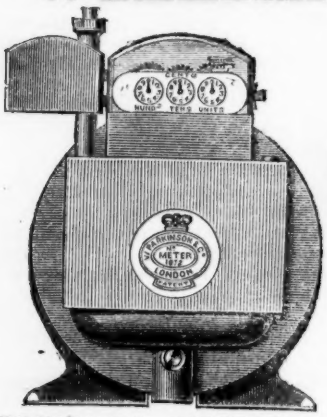
THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

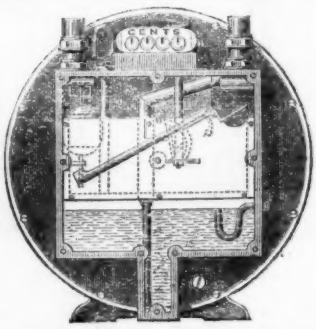
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

R. H.—*The Blackburn Gas-Works were transferred to the Corporation of Blackburn last year. The terms agreed upon were as follows:—The, holders of £15 A shares fully paid, entitled to 10 per cent. dividends, obtained perpetual annuities equal to maximum dividends, and a bonus of £2 per share; the holders of £15 B shares fully paid, entitled to 7½ per cent. dividends, also received annuities equal to maximum dividends, and a bonus of £2 per share; the holders of £10 C shares, upon which £5 only had been paid, received annuities of 7 per cent. on the amount paid up, and a bonus of £3 10s. per share.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 12, 1878.

Circular to Gas Companies.

The report of the Directors and the accounts of the Chartered Gas Company, for the past half year, have been issued, in anticipation of the General Meeting to be held on Friday, the 15th inst. The accounts show that the Company have again done a good half year's business. The receipts for common gas amounted to £775,386, which is £212 in excess of the corresponding half of 1876. The amount of the excess is small, but it is remarkable, seeing the reduction made in the price of gas in the interim. As might be expected, the receipts for cannel gas have decreased. This was inevitable, seeing that its limited consumption admits of no extension. Perhaps no item of receipt shows the progress made by the Company better than the meter-rents. These, in the past half year, have exceeded by £709 those of the corresponding half of 1876. Every new meter indicates an additional consumer. As to residuals, we have to notice the decrease in the value of coke, which is not remarkable, seeing the reduced price of coal. The value of tar fluctuates so much, that a decrease of £11,500 is not to be wondered at. Ammoniacal liquor is a commodity of stable value, and it is not surprising that, considering the increased quantity made, the receipts for this article were £3117 in excess of those of the corresponding half of 1876. Summing the whole up, the accounts show that the total receipts of the Company were £1,152,445, being a decrease of £28,540. This decrease is, of course, readily accounted for, and the only wonder is that it is not greater.

Turning to expenditure, we find a similar gratifying state of things. There is a decrease on almost every item. In coals the decrease is as much as could have been expected, considering the larger amount carbonized. A noticeable item is the cost of purification, which shows a decrease of £5071, when compared with the cost of the corresponding half of the previous year. We should be glad to know how this saving has been effected. It has certainly not been done at the expense of efficiency, for, taking all the stations into account, the Company's gas has never been better purified than during last half year. Putting together the whole of the expenses of manufacture, we notice a decrease of £10,861, as compared with the corresponding half of 1876. The worst enemy of the Company will admit that this one fact indicates highly efficient management. No less satisfactory, considering the extensions, is the decrease in the expenses of distribution, which, compared as before, amounts to £3287. In the cost of management, we notice an increase of only £793, which, considering the amount of additional business, we quote as an indication of the desire to promote economy. We note also one very gratifying particular, that the parliamentary expenses of the half year only amounted to £9. Those who so strongly object to the superannuation allowances—in some cases so hardly earned, and in all others justified on legal and moral grounds—will notice with satisfaction that these have undergone considerable reductions. The total expenditure on revenue account having been £760,455, and the receipts amounting to £1,152,445, the balance of gross profit to be carried to net revenue is £391,990, which, in consequence of the reduction in the price of gas, is necessarily less than the gross profit of the corresponding half of 1876. Reviewed as a whole, however, the revenue accounts must be regarded as of the most satisfactory character. They show efficient management, combined with economical arrangements, and are quite sufficient to allay all the distrust with which this particular Company have been so unjustly regarded.

Passing to the distribution of profits, we find that after payment of interest on borrowed money and dividends on preference shares, there remains a balance, which, added to that carried forward from previous half years, gives a sum of £326,536 applicable to the payment of dividends on ordinary share capital. This admits of the payment of full statutory dividends, as they were once called, and also allows the transfer of £30,640 to the reserve-fund, leaving a balance of £91,030 to be carried forward. It will thus be seen that, under the operation of the sliding scale, the Directors might have recommended the distribution of a larger dividend than ten per cent.; but we shall not question the soundness of their policy in adding as much as they can to their reserve-fund, and carrying forward a large balance. There are, no doubt, many Shareholders who, as times are at present, would have preferred the larger dividend, but the Directors have followed a provident course, for which the Shareholders may be grateful.

With reference to the details of manufacture, we may note that these are of the usual satisfactory character. The quantity of coal carbonized during the past half year was 521,540 tons, being an increase of 17,441 tons over the amount carbonized in the half year corresponding. This shows that the daily amount of coal carbonized was over 2860 tons. The make of gas from this quantity of coal was 5,405,198 thousands of cubic feet, which gives an average yield of about 10,050 feet per ton. Of this, so much is accounted for, that the loss by leakage is found to amount to only just about five per cent. We imagine it will be impossible to further reduce the leakage, and the fact that it has been brought so low reflects infinite credit on the officers of the Company. The progress of the business of the Company, and equally the extension of the Metropolis, are shown in the fact that since December, 1876, 522 public lamps have been added by them to those then standing in the streets; the total number now supplied by the Chartered Company being 34,844.

The report tells us that progress is being made in the construction of plant for the utilization of residuals. When this manufacture is in actual operation, we have little doubt but that a very considerable addition will be made to the yearly profits of the Company. As in a pig everything is eatable, so in gas-works everything is utilizable; not a particle of matter to be found in the works should be wasted. The waste which now results from lime purification may be easily avoided, and, for the rest, everything else is a saleable product.

A somewhat comical feature in the accounts and the report of the Directors is the allusion to the fine imposed upon the Company for an alleged deficiency of illuminating power in the gas supplied from one of their stations. The amount of the forfeiture—£74—looks ridiculously small; but, nevertheless, it is im-

portant, inasmuch as a great principle is involved. The money must be taken from funds applicable to dividend. The Act under which the forfeiture was incurred enacts that the simple certificate of a Gas Examiner shall be indisputable evidence of default in the absence of an appeal, or if the certificate be confirmed, on appeal, by the Chief Gas Examiner. We, last week, noticed some points on which the law required amendment. We do not know what are the provisions of the Bill which Mr. Stanhope, the Parliamentary Secretary of the Board of Trade, is about to introduce to the House of Commons; but we have, however, to urge that, under the Adulteration Act, which may be regarded as a typical enactment, a duplicate sample must be reserved for independent analysis. A duplicate sample of gas is impossible; and, therefore, we think it should be made imperative, that when any defect in the illuminating power is observed, immediate notice should be sent to the station from which the gas is supplied, so that an officer of the Company may attend at the testing-place, and verify the result. To call in the Chief Gas Examiner a week afterwards is a simple absurdity. He may, or may not, be able to attest the accuracy of the instruments; but of the quality of the article tested he can have no knowledge whatever.

Most probably the Bill, of which Mr. Stanhope has given notice—to "amend and consolidate the law relating to weights "and measures"—is to include sections to amend the Sales of Gas Act; but, as indicated above, we hope it will go further. We reserve, however, further remark until we have the text of the Bill before us. A Government measure can always be added to. Perhaps a Bill "to amend and consolidate the law "relating to weights and measures" may not be the proper vehicle in which to introduce an amendment in the law relating to the testing of gas; but we must press upon the Board of Trade the necessity for some alteration in the legislation with regard to it. Gas-testing is more or less a farce all over the country. It should be made real, or be left alone altogether. The General Act of 1871, now incorporated in every special Gas Act and Provisional Order, makes it imperative upon a Gas Company to set up a testing-station; but, in nine cases out of ten, these stations are never made use of by any Local Authority, or by any Examiner appointed by two Justices, upon the application of a number of consumers, and the Gas Company may be just as well saved the expense of the institution. If any alteration in the law be made, the appointment of a competent Examiner should be compulsory. It might, however, be difficult to find one in many places.

Under the old law, gas in the Metropolis was required to be tested three times a day, at intervals of an hour, during the hours of maximum consumption. Now-a-days, no particular hours are fixed, but it is required that gas shall be tested three times during the twenty-four hours. The letter of the law would, of course, be fulfilled if three testings were made, one after the other, as fast as the operator could make them; but the spirit of the Act, and the intention of the Legislature, would be utterly defeated by such a proceeding. We have a strong opinion that the old practice of testing in the evening hours was the best that could be adopted. But still an occasional day test would be a very proper thing. We allude to this matter, to call attention to the fact that the Metropolitan Board of Works have just appointed a single Examiner to do duty at Hill Street, Peckham, and Carlyle Square, Chelsea, which two stations are, as the crow flies, just about five miles apart. (We have not a book of cab fares to tell how many miles it is by road.) Now, an Examiner so able, active, intelligent, and conscientious as the gentleman appointed to the two stations, must find it extremely difficult to perform his duties with satisfaction to himself, to say nothing of the public. Boot-leather and cab hire are serious items of expense, and the salary of a Gas Examiner under the Metropolitan Board of Works is very small. The Board should take this matter into serious consideration.

It is useless to argue with some people. The Sheerness Local Board will wrangle with the Sheppy Gas Company about the price at which gas shall be supplied to public lamps, consuming on the average meter system. The object of the Board is to get gas at the same charge which is made to the Government for the Dockyard, but the absurdity of the proposal is evident. The law says that gas should be supplied to public lamps at the lowest price charged to private consumers, except under special contract. Now, the Government must be considered as a private consumer, taking gas under special contract, and the circumstances under which the Dockyard is supplied are so very different that no comparison can be made. Gas is taken by a main to the gates of the yard, is there measured by meter, and thereafter all that ensues is at the risk of the Government. This is a perfectly different thing to the supply of public lamps, which, in a town like Sheerness, involves the laying of long mains, which are but little productive, and may involve much leakage. The proposal of the Town Council for a special rate is utterly preposterous. The Company are about to make a reduction of threepence per thousand feet, which will apply to public as well as private consumers, and with that the Board must be content.

The Corporation of Worcester have resolved on sending a deputation of six of their number to inquire of the Gas Company whether they are willing to dispose of their undertaking, and on what terms. We shall not anticipate the answer they will receive. More rubbish has, perhaps, seldom been talked than was uttered at a meeting of the Town Council of Worcester, which met to discuss the question. It is not our business to defend all the doings of Gas Companies, but we may express an opinion that on the whole the inhabitants of Worcester have been well served by their Gas Company. Constituted with peculiar restrictions, the Company seem to have fairly discharged their obligations. That the price of gas has not been lower, and that "the toiling small tradesmen," as Alderman Woodward asserts, have been so greatly overtaxed, has not been the fault of the Company. Each party wanted the profits, and we sincerely hope the small tradesman has not gone without his. It is lamentable to hear bunkum of this sort talked in Town Councils. It introduces to the minds of the people communistic notions, which the speakers never intend to preach. We do not complain of Alderman Woodward's original motion, which was that the Corporation should negotiate for the purchase of the undertaking, in consideration of annuities equal to maximum dividends. There are, however, in the case of the Worcester Gas Company, circumstances which must lead to the rejection of such bare terms. The undertaking, as it stands, is worth very much more than the capitalized amount of the maximum dividends. The case of the Hereford purchase was not inappropriately quoted.

An extraordinary meeting of the Town Council of York, to discuss the terms of the petition to be presented to Parliament against the Bill of the York United Gas Company, was held as we announced, and a modified petition was adopted, which left out every complaint of the neglect of the promoters of the Bill to make provision for the reduction of the ten per cent. dividends. It is a noticeable fact that Mr. Leeman, M.P., made a special journey to York to assist in the deliberations of the Council. The results of these conferences seem at present to be involved in a certain amount of mystery. Communications have taken place between the two parties, and one of two things may have happened. The Company may have decided to concede most of the points urged against them by the Corporation, or they may have consented to sell their undertaking on satisfactory terms. The appearance of a stormy petrel above the waves, like Mr. Leeman, looks ominous; but we shall continue to indulge a hope that the York United Company will succeed in carrying their Bill, and long continue to exist, and enlighten the citizens of York and their surrounding neighbours.

Much dissatisfaction is expressed with the gas supply of Dartmouth, and it seems to be admitted by the Company that their present works are scarcely adequate to maintain a sufficient supply over the town. Thereupon arises the usual question of setting all other things right by the purchase of the undertaking by the Town Council. In this case they are frankly told that the Council may have the works if they will pay a fair price for them, so probably we may soon hear of the transfer.

Full moons are frequently sources of difficulty and dispute at Dartmouth, and at the not far distant town of Honiton. Their splendour is often concealed behind thick clouds; but, according to contract, the lamplighter stays at home. No doubt much gas is wasted in public lamps, but, after all, a paltry saving effected by leaving them unlighted on moonlight nights is hardly worthy of consideration. Devonshire seems to be altogether in an uproar about gas, for Exmouth, too, is in a commotion on the subject, with very little to complain of, we think.

The Gas and Water Committee of the Ramsgate Local Board have now got fairly under way. They start with very wide powers, and claim, to a certain extent, independent action, with the proviso that, if the Board do not approve of their conduct, a new Committee may be appointed. One of their first duties was to receive the little bill of their Parliamentary Agent, amounting to £3545, disbursements out of pocket. Another bill is expected, which it is estimated will raise the total cost of last year's parliamentary business to £5000. These are, of course, subject to taxation.

Bideford Public Lighting.—At the meeting of the Urban Sanitary Authority, on the 31st ult., it was resolved that the Clerk be instructed to advertise for tenders for lighting the town with gas, or otherwise, for a term not exceeding three years, or as may be agreed upon, from Lady-day next.

Water and Sanitary Notes.

THE Vestries appear to be unanimous in opposing, at all events, the "Supply Bill" of the Metropolitan Board of Works. A dual supply is considered to be perfectly unnecessary, and it is fully recognized that a large amount of vexation, accompanied by no compensating benefit, would be caused by the introduction of the second supply. Nor is every one satisfied that any advantage would be derived from the purchase of the existing works. A strong suspicion exists, that the public might be very much worse off under the Board than under the Companies. More than a suspicion is entertained that the Board, as we have said before, already overworked, would prove quite incompetent to manage so vast a concern as the combined water undertakings. They would, it is true, have the assistance of very able Engineers, and must be, indeed, entirely at the mercy of their officers.

It is a noticeable fact, too, that the millowners, &c., in the surrounding chalk districts are bestirring themselves. These gentlemen recognize the danger, that the abstraction of a large amount of water for the supply of the Metropolis might have a seriously detrimental effect on the volume of water in their streams, and the quantity to be obtained for the necessities of their own districts. It is noteworthy that the Rev. J. C. Clutterbuck—a great authority on the water-bearing strata around London—comes forward and declares that the proposed operations of the Metropolitan Board of Works would inflict immense injury on the owners and occupiers of land, and proprietors of wells, in the neighbourhood of the spots where the new wells are to be sunk. Reviewing the whole case, we may express a confident opinion that the "Supply Bill" has no chance of success, and that the best course the Metropolitan Board could pursue would be to withdraw it at once. As regards the Purchase Bill, we shall wait for a few days to see what will turn up, but in the meantime may state our belief that its chance is as hopeless as the other. The Vestry delegates sitting in Spring Gardens have overshot the mark. We think they will presently be made to see the light in which the metropolitan public and Parliament regard them. So long as they have confined themselves to what may be called their legitimate operations, they have received a certain amount of support—never, however, very cordially conceded. Now, when they seek to load the Metropolis with a mountain of debt for a more than questionable advantage, that support entirely falls away, and failure stares them in the face.

The York New Water-Works Company have decided to issue new capital to the amount of £20,000, the dividend on which is to be limited to five per cent. until 1888. The dividend declared a few days ago on the old ordinary stock was eight per cent. per annum, and it was plainly avowed that the object of limiting the dividend on the new capital was to protect the interest of the old. As the proprietors consented to the course proposed, we have nothing to say against it.

We fear that some encouragement may be given to filibustering by the success of the Dartmoor and Exeter Water Company in extracting £2000 from the coffers of the Exeter Corporation. The Company have a name, and may, perhaps, have had a local habitation, but never had any works, and, probably, never would have had. It was the plan of a few schemers, who plotted against the old Exeter Water Company, from whom they possibly hoped to extort a considerable sum of money. As matters have turned out, however, perhaps some indignant ratepayer of Exeter may presently inquire for what the £2000 was paid by the Corporation. When that intelligent body purchased the undertaking of the old Company, they were perfectly free from all danger of competition, and the £2000 of the ratepayers money was simply squandered.

The Corporation of Colchester appear to have a considerable quantity of land, which, in these days, is, of course, not very productive. Land at present pays about three per cent., while well-managed water undertakings may pay about five or six per cent.; so the Town Council of Colchester are seriously considering the advisability of disposing of their land, in order to buy up the water undertaking. Gas undertakings are still more profitable, if properly managed; and, if the money will run to it, there is a desire on the part of some of the Town Council to acquire the gas undertaking as well.

The Corporation of Bolton, not having been able to come to terms with the Corporation of Manchester, are determined on opposing the Thirlmere scheme of the latter. It seems that the works proposed by the Manchester Corporation will cross those of the Corporation of Bolton, who complain that the Bill laid before Parliament offers them no efficient protection. The great fight in Parliament will soon come off, and we shall speedily learn the fate of the Thirlmere scheme. We need not repeat that we wish it success.

Wigan and other Corporations in the north agree with that of Manchester, who will go to Parliament with a very strong case. They have issued a statement in support of the second reading of the Bill, which must command attention. It is noteworthy that while the petition of what is called the Thirlmere Defence Association has received the signatures of only one hundred and twenty-two persons, and these mostly unconnected with the district, other petitions have been presented in favour of the Bill, signed by upwards of three thousand owners and occupiers in the neighbourhood.

Reading, like every other borough which has indulged in the luxury of sewage farming, loses money by the venture. It has, too, found it far from remunerative. A large debt has been incurred on account of two farms, and now more is wanted. In the meantime, rates have risen so prodigiously that people who went to the town some years ago in the hope of finding cheap homes are rapidly leaving the place.

It seems probable that the Scarborough Water Company will pass into the hands of the Scarborough Corporation, the Company making no objection.

WATER BILLS FOR 1878.

The *Batley Corporation Water-Works Bill* proposes to raise £180,000 on mortgage of water-rates, borough-funds, and other rates, for the purpose of completing and extending the water undertaking authorized by the Act of 1871. The money is to be paid off by means of a sinking-fund, which is to be commenced after ten years from the passing of this Act.

The *Bedlingtonshire Local Board Water Bill* is to authorize the Local Board to acquire lands, and appropriate certain streams, which were not mentioned and described in the Provisional Order the Board obtained in 1875.

The *Bradford Water and Improvement Bill* is, among other things, to authorize the Corporation to raise £140,000 for the extension and the improvement of their water-works. For the rest, the Bill is to authorize recreation-grounds and street improvements, which it is calculated will add £445,000 to the debt of the Corporation.

The *Cardiff Water-Works Bill* is to empower the Cardiff Water Company to raise additional capital to the amount of £200,000, carrying the usual borrowing powers, for the purpose of extending the works, for the supply of a rapidly increasing district.

The *Cheltenham Corporation Water Bill* is a confiscatory measure aimed at the Cheltenham Water Company, which it proposes to authorize the Corporation to acquire on compulsion, by giving notice within three years of the passing of the Act. The terms of the purchase are to be settled by agreement or arbitration. The Corporation seek power to borrow £70,000 beyond what may be required for the purchase of the undertaking. What advantage the inhabitants of Cheltenham will derive by the transfer of the undertaking it is impossible to say. We may assume they would continue to drink the waters of the Severn contaminated by the sewage of several towns above them, and that they will not be the least the worse off for it. The water-rates would be none the lower, and what object is to be gained by the transfer we are at a loss to imagine. Water undertakings are rarely profitable in the hands of Local Authorities, and they ought not to be. Their management is invariably expensive, and ratepayers are not the least benefited when a change of possession is made.

The *Cheltenham Water-Works Bill* is promoted for the purpose of authorizing the Company to raise capital to the amount of £72,000, for maintaining a supply of water from the Severn in an extended district. Beyond this we see nothing novel in the provisions.

The *Cockermouth and Workington Water Bill* is promoted to enable the two Local Authorities to take a supply from Crummock Lake, in the West of Cumberland. So far as we know, no opposition is made to the appropriation of this lake, one of the most unpicturesque in the Lake district. No defence association has been formed, and no gushing middle-aged ladies or Cockney tourists have protested against the appropriation of the water of the lake for slaking the drought and washing the persons of the rather dusky population of Cockermouth. For the purposes of the Act the joint Boards seek power to borrow £26,500. The engineering works are, of course, extremely simple.

The *Dartmoor and Exeter Water Bill* is promoted by a clique whose object was to confiscate the undertaking of the present Water Company. The Bill is virtually abandoned, and, therefore, need not be noticed.

The *Deal Water Bill* is to authorize the Deal Water Company

to raise additional capital to the amount of £10,000, carrying the usual borrowing power to the extent of one-fourth.

The *Dore Water Bill* is to incorporate a Company for the supply of water to Dore and a surrounding district in the neighbourhood of Sheffield. A small catchment scheme seems to be proposed, which is to be supplemented by a supply from the Sheffield Water-Works Company. The rates are to be the same as those charged by the Sheffield Water Company. The proposed capital of the Dore Company is £10,000.

The *Dublin Corporation Water Bill* is to authorize the Dublin Corporation to construct additional water-works at an estimated outlay of £15,000.

The *Durham Water Bill* is to dissolve and re-incorporate the Durham Water-Works Company, who supply water to the city and environs of Durham from the river Wear and some wells in the neighbourhood. The original capital of the Company is to be £32,500, and this Bill seeks power to raise additional, to the amount of £32,500. Borrowing powers to the usual extent are asked on both old and new capital. The Bill is to confer all the customary powers of a Water Company. The ordinary rates and usual extras are allowed.

The *Exeter Water Bill* is to confirm an agreement entered into between the Exeter Water Company and the Corporation, to take over the works of the Exeter Water Company. After long squabbling, the Corporation agreed to the terms offered by the Company. The Corporation, we presume, will pay the expenses of the filibustering Company named above, and will go on supplying water from the same source as the Company obtained it. The terms of purchase have been commented upon in our columns, and need not be here repeated. The Corporation ask power to borrow £120,000.

The *Forfar Water Bill* is to enable the Commissioners of Police of Forfar to construct additional works for the better supply of Forfar and the adjacent district. For this purpose power is asked to borrow £50,000, to be repaid in the usual way.

The *Grand Junction Water-Works Bill* is to authorize the Company to raise additional capital to the amount of £300,000, with the usual borrowing powers.

The *Manchester Water Bill* is, of course, to authorize the Thirlmere scheme, about which nothing need be said here. The Bill seeks power to borrow £3,750,000, a sum greatly in excess of what was first thought would be required.

The *Mid-Cheshire Water Bill* is to incorporate a Company for the supply of water to a number of small towns and villages in the centre of Cheshire. The source of the water is to be a well in the new red sandstone. The authorized capital of the Company is £80,000, carrying the usual borrowing powers.

(To be continued.)

KIRBYMOORSIDE GAS AND WATER COMPANY.—The annual meeting was held on the 6th inst., when a dividend of 5 per cent. was declared. The *Leeds Mercury* states that for some years there has been in agitation a scheme for bringing a supply of pure water to the town of Kirbymoorside. The Local Government Authorities in London recently held a commission of inquiry as to the best source of supply, and from the report of their Inspector, advised the Local Authority on the spot to carry out a proposition from the Gas and Water Company, to bring a supply from Harland Moor; but, in consequence of the cost, the Local Board demur to this. The Shareholders decided to offer their plant to the Sanitary Authority, and thus let them have the opportunity of bringing the water at a less cost, if possible.

ENNIS WATER-WORKS.—No small amount of disappointment has been felt at the announcement of the receipt, by the Town Commissioners and Urban Sanitary Board of Ennis, of a communication from the Board of Works announcing that the calculations made did not show that the rating of the borough, which was offered as security for repayment of the grant of £12,000, asked as a loan for the construction of water-works, was such as to warrant a recommendation to Government to advance the sum required. So far this ends a vexed question which gave rise to much bickering between the Commissioners and the Ratepayers, it being contented that a majority of the latter were opposed to the scheme, owing to the large amount of taxation the project would entail. The river which surrounds Ennis is polluted by sewage and all sorts of impurities, and with the exception of three pumps in Ennis, from which the inhabitants at present obtain a supply, all the others, with the wells included, have been pronounced by Dr. Cameron, upon analysis, impure, unfit for use, and dangerous to health. Steps will be taken to have the matter speedily brought under the notice of Parliament.—*Freeman's Journal.*

MEXBOROUGH WATER-WORKS COMPANY.—At the first meeting of this Company, held on the 4th inst., it was stated that since the formation of the Company, in May, 1877, the works had been got into successful operation, and the demand for the Company's water had been better than expected. The amount expended on works up to the end of 1877 was about £3000, which included street-pipes to most of the principal streets in the town. The report of the Engineer and Manager, Mr. Tomlison, stated that the works were in good condition, and had earned a dividend of 5 per cent. on the amount paid up to the end of the year 1877. The profit for part of the year 1877 would be carried forward to 1878 account. In answer to inquiries, the Engineer stated that the whole of the capital of the Company—£10,000—is subscribed for, and nearly one-half paid up. There is about £2000 still to spend, half of which will be for extension of works, and the other half for land, law, engineering expenses, &c., making the total outlay within the original estimate of £5000. The income of the Company in 1877 was sufficient to earn a profit of 5 per cent. on the capital paid up, and was progressing so favourably that a dividend of 10 per cent. may be confidently expected for 1878.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

METROPOLIS WATER SUPPLY.

SIR,—The proposed action of the Metropolitan Board of Works in this matter cannot fail to be deeply interesting to the Water Consumers and Inhabitants of the Metropolis. The Board have introduced into Parliament two Bills, one to authorize them to purchase the undertakings of the Water Companies, and another to construct new works and bring in a supply of pure spring water for drinking, extinguishing fires, &c., and for that purpose to lay down a separate set of pipes throughout the Metropolis.

Neither of these Bills at present contains one word about rates, but rating powers will, of course, be given to the Board if they purchase the Water-Works Companies undertakings, and probably of the same compulsory character as those possessed by the Corporation of Manchester.

The important question to be first considered is whether it is better for the public that the water supply should be vested in a public body or in a trading company, and on this all-important point there is much to consider on both sides. The Board will say, "The health and cleanliness of the Metropolis is committed to our care, and as an abundant supply of pure and wholesome water is essential to this end, the water supply ought to be in our hands. You, the Water Companies, seek to make profits for your Shareholders; we, the Board, seek no profit, but will supply at cost price. It is therefore for the public advantage that the water supply should be vested in us." The Companies, on the other hand, will say, "Water supply is essentially a trading speculation, which may turn out a profit or a loss; you, the Board, have no right to spend public money in a trading speculation; we have incurred the risk; some of us have been many years without a dividend, and now that we have established useful and profitable undertakings, and supply the Metropolis abundantly with water which has been pronounced by Parliamentary Committees to be good and wholesome, you seek to deprive us of the fruit of our risk and labour, and compulsorily take away our property." The ratepayers will disregard all such disputes, and the question they have to decide is, "Shall we get a better, cheaper, and more abundant supply of water from the Board than from the Companies? If so, by all means let the Board have the works in their own hands. If we cannot clearly see our way to these advantages, then it is better to bear the ills we have than fly to others that we know not of."

Fortunately for the ratepayers, they can decide the question from results and recorded facts, which are better than any amount of speculative arguments. The experiment of entrusting public bodies with water supply has been tried in various cities and towns, such as Manchester, Liverpool, Leeds, Edinburgh, and several other large towns, and doubtless many of these cases will be cited as precedents in favour of the Board. From all that I can learn of these cases, I cannot fix upon one where the ratepayers have derived any real advantage from the change. But let us see from their own figures and statements what the Board propose to do in the Metropolis.

As to cost, the Board admit that their proposed second supply will cost about £5,500,000, and involve an increased expenditure of £225,000 a year. That, of course, means a dearer instead of a cheaper supply. But the Board propose to purchase the several undertakings of all the Metropolitan Water Companies, and thereby hope to effect some saving. This, however, is very doubtful; the shares of all the Companies are at a considerable premium, and a very much larger amount of capital will have to be raised for the purchase-money than the present nominal capital of the several Companies. Neither can the Board do with a much smaller working staff than at present employed by the Companies, and, with the want of experience of the Board in administering the water supply, any saving in interest on capital, expense of management, or otherwise, is an unknown quantity, and certain to be very much less than the proposed increase of £225,000 a year. The chief object of this additional expenditure is to provide a separate set of pipes throughout the Metropolis, with constant high pressure, for the extinguishment of fires (the further objects of supplying drinking and potable water to the houses will be afterwards considered). I learn from the evidence taken before the Committee of the House of Commons on the Metropolitan Fire Brigade, in 1876-7, that the total sum insured on Metropolitan property, in the several insurance offices, is £540,000,000; and, taking the premium at 2s. per £100 (which I believe to be a fair average), the total amount of annual premiums amounts to £540,000; so that the Metropolitan Board of Works propose to expend annually more than half the amount at present annually paid by the inhabitants of the Metropolis for insurance against fire. Surely this is an extravagant proposal! It is true that only about one-third of the whole metropolitan property is insured, according to the evidence given before the Fire Brigade Committee, but this fact only tends to show that under the present arrangements the chance of loss by fire is comparatively small; and, moreover, it is doubtful whether much greater security would be gained by the proposed arrangement, for we find that large fires do occur, even in cities and towns where the pressure is sufficient to throw a jet of water over the houses without the aid of a fire-engine. Then we may fairly doubt the figures of the estimate of five and a half millions. There are 1500 miles of streets in the Metropolis, and 419,374 inhabited houses; and, as we know from experience that few works are ever constructed at the estimated cost, the ratepayers must be prepared for a considerable expansion of the estimated annual increased cost of £225,000.

Let us see what advantages the ratepayers will derive from the inevitable additional rates which they will have to pay. It is proposed to furnish each house with a separate set of water-fittings, and to supply a small quantity of spring water, derived from wells in the chalk, for drinking and culinary purposes, but for all other purposes the present supply is to be continued without any alteration. The Board do not tell us how they can control the purposes for which the spring water shall be used. It is hard water, and for drinking is more pleasant than soft water, but for cooking and making tea it is not so good as the water

at present supplied. It has more carbonate of lime in it, and this makes a larger deposit on the utensils in which it is boiled, or if used to boil meat, it makes a large quantity of what the cooks call "scum." The only advantage, therefore, which the water consumers will gain for the largely increased rates is a small quantity of drinking water; for all other purposes the water now supplied is better.

But it will be said I have almost ignored the advantages in cases of fire. I do not deny that it would be an excellent thing to have mains always charged under high pressure for use at fires, but the question is whether it is worth the vast sum of money proposed to be spent upon a separate fire supply. At present the Companies supply water for fires free of cost. Fires will happen whatever remedies are provided; prudent people will insure, and it is not likely that the insurance offices will lower their rates if the proposed scheme be carried out; thus, any additional security for insured property will benefit the Insurance Companies.

I am inclined to think that the complaints against the London water supply strongly resemble Irish grievances which have passed away. No one can deny that formerly, when the supply was taken from the tidal portions of the Thames, the quality of the water was very objectionable, but that state of things has long since been remedied. Still the agitation against the London water supply has continued, and various parliamentary inquiries, for nearly thirty years past, have been made from time to time, where all parties have had ample opportunity of stating their views, and what are the results? In 1867 a Committee of the House of Commons, over which Mr. Ayrton presided, reported, after a long investigation: "We are satisfied that both the quality and quantity of water supplied from the Thames are so far satisfactory that there is no ground for disturbing the arrangements made under the Act of 1852, and that any attempt to do so would only end in entailing a waste of capital, and an unnecessary charge upon the Owners and Occupiers of property in the Metropolis."

In 1869 an extensive inquiry as to the London water supply was made by Royal Commissioners, of which the Duke of Richmond was Chairman, and they reported: "We are of opinion that there is no evidence to lead us to believe that the water now supplied by the Companies is not generally good and wholesome."

It is admitted that the water supplied from the Thames has greatly improved, and what little sewage passes into the river above the sources of supply is gradually being diverted; in fact, it is now illegal to run sewage into the Thames, under the Thames Navigation Acts of 1866 and 1867, and the Water Companies pay £7000 a year towards the expense of enforcing their provisions; but delays have occurred in some places, in consequence of alleged difficulties in providing other means of disposing of the sewage. I need say no more about the quality of the London water, because, whatever it be, the Board do not propose to improve it—they merely supply a small quantity of hard water for drinking purposes—as far as domestic supply is concerned. The Board seem at length to have awakened to a knowledge of the fact that the Thames is the natural water supply for London, and that, practically, there is no other source equal to the supply. They formerly made a great agitation about constant supply. The Companies said they would willingly give a constant supply if the public would find proper house-fittings to receive it, and the Board obtained parliamentary powers to enforce it; but they now say they shrink from the responsibility of compelling the ratepayers to expend the requisite money on fittings for a constant supply.

The cry of the Board is, "Something must be done." That is what the late Board of Health said in 1851, and their "something" was to bring soft water to London, and effect a saving to the inhabitants of soap and tea; and they devised the scheme of bringing soft water from Bagshot Sands, and they brought in a Bill for the compulsory amalgamation of all the London Water Companies, with a view to compel them to distribute this soft water. It was, however, proved before the Committee on that Bill that nothing like the requisite quantity of water could be obtained from these Sands (in fact, not half the quantity), that it was dangerous to pass it through leaden pipes, and that a large portion of it was contaminated with peat, loam, and oxide of iron. Yet the Board of Health believed in it, and, but for the investigations of other parties, would probably have persevered in the costly and useless experiment.

It remains only to consider the probable result of vesting the London water supply in the hands of the Board of Works. We have seen clearly that the cost to the ratepayers must be increased, and the only advantage a little drinking water. The Companies cannot spend too much money on improvements to please the ratepayers, because the Companies cannot exceed their parliamentary rates and dividends. The Board, on the other hand, cannot spend too little money to please the ratepayers, and will have compulsory powers of rating. In several towns supplied by Corporations, improvements in water supply have been delayed for years, by pledges extracted from candidates for municipal offices not to sanction the expenditure of money for improvements in the water supply. This happened especially at Liverpool and Worcester. London, fortunately as I think, has no municipal body; but, in the country towns, municipal business is often impeded by party politics, and these political disputes are often intruded into very unpolitical subjects. At Southampton a dispute arose about the source of the water supply—one source was called the Whig source, and another the Tory source, and in the meantime the works stood still. The Metropolitan Board are a changing body, with no pecuniary interest in the funds they administer, and, except the Chairman, without pay, and I do not believe that any such body of men, however honest and industrious, can do their work with the same thrifty economy and care as the Directors of a Company who have always a large pecuniary interest in the Company. I do not mean to say that there are not well-managed corporation water-works, but there have been many sad failures. Now, if the Companies fail, they suffer the loss; but, if the Corporations fail, the loss falls on the public. Edinburgh, Dundee, and Dunfermline each undertook the water supply by the Corporation. They each failed, and the supply in each case was handed over to a Company. The Corporation of Edinburgh have since bought up the Company, I believe, at a good premium. Manchester is supplied with both water and gas by the Corporation. The gas is made chiefly from coal from Wigan, which is rather nearer to Manchester than Liverpool. The gas at Manchester is dearer than at Liverpool, though both are made chiefly from Wigan coal. Liverpool gas is supplied by a Company paying over 9 per cent. dividend. The explanation came out in 1851, in evidence taken before a Committee of the House of Commons, that, in order to make the water-rate at Manchester appear less, a large annual sum derived from the profits on gas was carried to the water account. This fact exposes another objection to water supply by public bodies, that of so manipulating the accounts and mixing up the rates as to mislead the public as to the real cost of the water supply. The advocates of municipal water supply were heard before the same Committee. I have carefully read the evidence, but do not find a single case in which it was attempted to be proved by figures that the ratepayers under municipal water supply had gained any advantage.

I have derived my facts from the various parliamentary reports and evidence on the Metropolis water supply, and I am forced to the conclusion that for many reasons it is not desirable to vest the water supply in the Metropolitan Board of Works. I think it is undesirable on behalf of the Board, as introducing an element of strife and contention, and imposing on them a troublesome duty, in which they have had no experience, and of too vast an extent to be satisfactorily performed, consistently with their other important duties. It is futile to point to Manchester, or any other city or town, as a precedent. London has no parallel in the world. It is not desirable on behalf of the public, and would certainly entail on them largely increased rates of a compulsory and arbitrary character in respect of all buildings, whether they used the water or not. It would place an immense revenue at the disposal of the Board of Works, and expose them to the temptation of trying expensive experiments, similar to the Bagshot Sands scheme of the late Board of Health.

I do not believe that the Board seriously think they can carry out the second supply scheme, about which they are nearly equally divided; and I think it may be safely assumed that if they purchase the undertakings of the Water Companies the water supply of London will continue the same as it now is, but with additional compulsory charges on the ratepayers.

Feb. 9, 1878. H. W.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, FEB. 4.

The Examiners reported that the Standing Orders applicable to the West Houghton Local Board Bill have been complied with; that the further Standing Orders applicable to the Imperial Continental Gas Association Bill have been complied with; and that the further Standing Orders applicable to the South Staffordshire Water Bill have not been complied with.

Bills read the first time:—Bedlington Local Board (Water); Castleford Local Board; Mansfield Commissioners Gas.

Bills read a second time:—Clitheroe Gas, Water, and Improvement; Dublin Corporation Water-Works Acts Amendment; Forfar Water; Sutton-in-Ashfield Gas.

A petition against the Newry Gas Bill was presented from the Newry Gas Consumers Company.

TUESDAY, FEB. 5.

The Examiners reported that the Standing Orders applicable to the Waterford Corporation Water and Improvement Bill have been complied with; and that the further Standing Orders applicable to the Castleford and Whitwood Gas, Exeter Gas, and Warrington Water Bills have been complied with.

Bills read a second time:—Exeter Corporation Water; Leicester Corporation.

THURSDAY, FEB. 7.

The Examiners reported that the Standing Orders applicable to the Drumcondra, Clonliffe, and Glasnevin Township Bill have been complied with; and that the further Standing Orders applicable to the Normanton Gas Bill have been complied with.

Bills read a second time:—Imperial Continental Gas Association; Newry Gas.

Petitions were presented against the following Bills:—Batley Corporation Water, from Corporation of Dewsbury and Heckmondwike Local Board; Castleford and Whitwood Gas, from Charles Wheler Wheler; Castleford Local Board, from Castleford and Whitwood Gaslight and Coke Company, Limited; Clitheroe Gas, Water, and Improvement, from Lancashire and Yorkshire Railway Company; Normanton Gas, from Castleford and Whitwood Gaslight and Coke Company, Limited.

FRIDAY, FEB. 8.

The following reports from the Standing Orders Committee were agreed to:—"That the Standing Orders not complied with in respect of the South Staffordshire Water Bill ought to be dispensed with, and the Bill allowed to proceed, provided that proof be given before the Examiners that the Bill has been approved of at a meeting of the Company called and held in accordance with Standing Order No. 62." "That in respect of the Nottingham Improvement, Gas, and Water Bill the Standing Order not complied with in respect of clause 7 may be dispensed with, the only person interested therein having consented thereto; and the Standing Order not complied with in respect to clause 33 may also be dispensed with, provision being made in the Bill for the protection of the domestic supply of water within the limits of the borough." "That the Standing Orders not complied with in respect of the Cheltenham Corporation Water Bill ought to be dispensed with."

Bills read a second time:—Castleford and Whitwood Gas; Exeter Gas; Warrington Water.

Petitions against the following Bills were presented:—Batley Corporation Water, from (1) London and North-Western Railway Company, (2) Walter Thomas William Spencer Stanhope, (3) Edmund Barber; Castleford and Whitwood Gas, from Castleford Local Board; York United Gas, from Bulmer East Highway Board.

HOUSE OF COMMONS.

MONDAY, FEB. 4.

METROPOLIS WATER-WORKS (PURCHASE) BILL.—The Examiners reported that the Standing Orders have been complied with in the case of this Bill.

The Examiners reported that Standing Order 62 has been complied with in the case of the Grand Junction Water Bill; and that Standing Order 63 has been complied with in the case of the Durham Water Bill.

The petition was presented for the Torquay Gas Bill, which was ordered to be brought in by Sir John Kennaway and Mr. Rodwell.

The Nottingham Improvement, Gas, and Water Bill was ordered to be brought in by Mr. W. E. Denison and Mr. Isaac.

Bills read the first time, and ordered for second reading:—Cheltenham Corporation Water; Dore Water; Maryport Improvement; Scarborough Corporation Water.

Bills read a second time and committed:— Bradford Water and Improvement; Brading Harbour District Gas; Cheltenham Water; Nottingham Water.

Petitions against the following Bills were presented:—Bangor Local Board, from London and North-Western Railway Company; Cheltenham Water, from (1) Midland Railway Company, (2) Corporation of Cheltenham; Cleveland Gas, from Thomas Garbutt and others; Cockermouth and Workington Water, from (1) Trustees under the will of William Marshall, deceased, (2) London and North-Western Railway Company; Durham Water, from North-Eastern Railway Company; Farnworth and Kearsley Gas, from Moses Gate and Ringley Branch Turnpike Road Trustees; Grand Junction Water, from Metropolitan Board of Works; Manchester Corporation Water, from (1) Corporation of Liverpool, (2) Lord Egerton of Tatton; Marske and Saltburn Gas, from (1) Cleveland Gas Company, (2*) Owners, &c., in or near Saltburn-by-the-Sea; Metropolis Water Supply, from (1) Earl of Egmont, (2) Epsom Local Board of Health, (3) Great Western Railway Company, (4) Great Eastern Railway Company, (5) Midland Railway Company, (6) South-Eastern Railway Company, (7) Conservators of the River Thames, (8) South Essex Water-Works Company, (9) London, Chatham, and Dover Railway Company, (10) London and North-Western Railway Company, (11) Vestry of St. Pancras, Middlesex, (12) London, Brighton, and South-Coast Railway Company; Nottingham Water, from Hucknall Torkard Local Board; Radcliffe and Pilkington Gas, from Governors of the Bolton Free Grammar School; Shrewsbury Gas, from (1) Great Western Railway Company, (2) London and North-Western Railway Company.

Tuesday, Feb. 5.

The petition was presented for the West Houghton Local Board Bill, which was ordered to be brought in by Mr. Hardcastle and Mr. Hick.

The Examiners reported that Standing Order 62 has been complied with in the case of the Bangor Water and Gas, Hartlepool Gas and Water, and Scarborough Water Bills; and that Standing Order 63 has been complied with in the case of the Sevenoaks Water, and Tredegar Water and Gas Bills.

Bill read the first time, and ordered for second reading:—Nottingham Improvement, Gas, and Water.

Bill read the first time, and referred to the Examiners:—Torquay Gas.

Bill read a second time, and committed:—Hamilton Burgh.

Petitions were presented against the following Bills:—Bradford Water and Improvement, from Oxenhope Local Board; Cheltenham Corporation Water, from Ecclesiastical Commissioners for England; Cleveland Gas, from (1) North-Eastern Railway Company, (2) Consumers of gas and others in Marske and Saltburn; East Retford Borough, from (1) Great Northern Railway Company, (2) Manchester, Sheffield, and Lincolnshire Railway Company; Manchester Corporation Water, from Corporation of Blackburn; Metropolis Water Supply, from (1) Lambeth Water-Works Company, (2) Joint Lessees of North and South Western Junction Railway, (3) Commissioners of Sewers for the Levels of Havering, Dagenham, &c., (4) Willesden Local Board, (5) Edgware Highway Board, (6) Kent Water-Works Company, (7) Chelsea Water-Works Company, (8) Sutton District Water Company, (9) Grand Junction Canal Company, (10) Corporation of the City of London, (11) Grand Junction Water-Works Company, (12) East London Water-Works Company, (13) Surveyors of Highways for Norwood, Middlesex, (14) Bromley Local Board, (15) Millowners and others on or near the Rivers Ravensbourne, &c., (16) Millowners and others on or near the River Colne, (17) Millowners and others on or near the Rivers Hogg's Mill, &c., (18) Her Majesty's Commissioners of Sewers for Rainham to Mucking Levels, (19) West Middlesex Water-Works Company, (20) New River Water-Works Company, (21) Southwark and Vauxhall Water Company, (22) Justices of the Peace for Middlesex, (23) Regent's Canal Company, (24) Poplar District Board of Works, (25) Eliza Macfarlane Begg, (26) Lea Conservancy Board; Radcliffe and Pilkington Gas, from (1) Little Lever Local Board, (2) Whitefield Local Board, (3) Prestwich Local Board, (4) Radcliffe Local Board; Scarborough Water, from (1) Sir Harcourt Johnstone, Bart., (2) North-Eastern Railway Company.

Wednesday, Feb. 6.

Bills read a second time and committed:—Cardiff Water; Newbury Borough Extension; Stoke-upon-Trent Corporation Gas.

Petitions were presented against the Bournmouth Gas and Water Bill, from Bournemouth Commissioners; and against the Manchester Corporation Water Bill, from Mary Countess Ossalinsky, and (the petitioners not praying to be heard) Hogarth John Swale and others.

Thursday, Feb. 7.

The Examiners reported that Standing Order 62 has been complied with in the case of the South Hants Water Bill; and that Standing Order 63 has been complied with in the case of the Lewes Gas Bill.

Bill read the first time, and ordered for second reading:—West Houghton Local Board.

Petitions against the following Bills were presented:—Bradford Water and Improvement, from (1) Millowners, &c., on River Worth, (2) Great Northern Railway Company; Brading Harbour District Gas, from Sandown Local Board; Cardiff Water, from (1) William Steward Cartwright, (2) Owners of the Heath Estate, (3) Marquis of Bute and his trustees, (4) Inhabitants of Glamorganshire; Manchester Corporation Water, from James Omrod, William Gray, and William Hargreaves; Metropolis Water Supply, from Vestry of Mile End Old Town; Nottingham Improvement, Gas, and Water, from Great Northern Railway Company; South Hants Water, from South Stoneham Rural Sanitary Authority.

Petitions against the Manchester Corporation Water Bill (the petitioners not praying to be heard) were presented from—(1) Prescott Hewett and others, (2) Owners, lessees, and occupiers in the Lake District of Lancaster, Rev. H. D. Rawnsley and others, (3) Owners, &c., in the county of Westmoreland, Thomas Mason and others, (4) Owners, &c., in the county of Westmoreland, S. P. Boutfleurs and others, (5) Owners, &c., in the county of Westmoreland, S. Cooper and others, (6) Owners, &c., in the county of Westmoreland, Henry Ware, (7) Owners, &c., in the county of Cumberland, J. J. Spedding and others, (8) Owners, &c., in the county of Cumberland, Mary Stamper and others, (9) Members of the University of Oxford, (10) Members and Associates of the Royal Academy of Arts, (11) Members and Associates of the Society of Painters in Water Colours, (12) Bishop of St. Andrew's and Principal of St. Andrew's University and others, (13) John Richard Green and others, (14) James E. Backhouse and others, (15) Thomas Carlyle and others, (16) Residents in Manchester and suburbs, (17) Residents in York and elsewhere, (18) Residents in Leeds and elsewhere, (19) Residents in Liverpool and elsewhere, (20) Residents in Sheffield and elsewhere, (21) Residents in Huddersfield and elsewhere, (22) Residents in Huddersfield, Sheffield, and elsewhere, (23) Residents in Newcastle-on-Tyne and elsewhere, (24) Residents in Bury, Lancashire, and elsewhere, (25) Residents in Birmingham and elsewhere, (26) Residents in Scarborough and elsewhere, (27) Residents in Ambleside and elsewhere, (28) Residents in Keswick and elsewhere, (29) Residents in Warrington and elsewhere, (30) Residents in Bristol, Bath, and elsewhere, (31) Residents in Berkshire and elsewhere, (32) Residents in Cheltenham and elsewhere, (33) Residents in Hampshire and elsewhere, (34) Residents in Hastings and elsewhere, (35) Residents in Norwich and elsewhere, (36) Residents in Somersetshire and elsewhere, (37) Residents in Leicester and elsewhere.

* This petition is also in favour of the Cleveland Gas Bill.

Friday, Feb. 8.

The petition was presented for the Drumcondra, Clonliffe, and Glasnevin Township Bill, which was ordered to be brought in by Mr. Ion Trant Hamilton, Mr. Sullivan, and Mr. Dalway.

The Examiners report, "That Standing Order 62 has not been complied with in the case of the Limerick Corporation Gas Bill," was referred to the Select Committee on Standing Orders.

Bill read a second time and committed:—Dalton-in-Furness Local Board.

Petitions against the following Bills were presented:—Bradford Water and Improvement, from (1) Heaton Local Board, (2) Eccleshill Local Board, (3) Hunsworth Local Board, (4) North Bierley Local Board, (5) Clayton Local Board, (6) Windhill Local Board, (7) Cleckheaton Local Board, (8) Birstal Local Board, (9) Calverley District Water-Works Company, Limited, (10) Midland Railway Company, (11) Matthew Todd, (12) Leeds and Liverpool Canal Company; Brading Harbour District Gas, from (1) Sandown Gas and Coke Company, Limited, (2) Shanklin Gas Company, Limited, (3) Shanklin Local Board; Cardiff Water, from (1) Corporation of Cardiff, (2) Great Western Railway Company; Hemel Hempsted District Gas, from Hemel Hempsted Highway Board; Lee Bridge District Gas, from Walthamstow Local Board; Manchester Corporation Water, from (1) Corporation of Oldham, (2) Earl of Lonsdale and others, (3) Corporation of Preston, (4) Stanley Hughes le Fleming, (5) Midland Railway Company, (6) Ratepayers of Manchester, (7) Charles Joseph Stonor; West Houghton Local Board, from (1) Duke of Bridgewater's Trustees, (2) Justices of the Peace for the county palatine of Lancaster, (3) Lancashire and Yorkshire Railway Company.

Saturday, Feb. 9.

A petition in favour of the Cheltenham Water Bill was presented from Tewkesbury Rural Sanitary Authority.

Petitions against the following Bills were presented:—Bangor Local Board, from Lord Penrhyn (against alterations); Bangor Water and Gas, from (1) Bangor Local Board, (2) Lord Penrhyn (against alterations); Brading Harbour District Gas, from Inhabitants, Owners of property, and Ratepayers of Brading; Cheltenham Corporation Water, from the Great Western Railway Company; Dalton-in-Furness Local Board, from Furness Railway Company; Hemel Hempsted District Gas, from Grand Junction Canal Company; Lee Bridge District Gas, from Leyton Local Board and Consumers of Gas; Manchester Corporation Water, from (1) Charles Johnson, (2) Corporation of Bolton, (3) Andrew Knowles and Sons, Limited, (4) William Ford Hulton, (5) Leonard Stanger Leathes, (6) London and North-Western Railway Company, (7) Owners, &c., of land, and persons interested in streams, (8) Justices of the Peace for the county palatine of Lancaster, (9) Duke of Bridgewater and Earl of Ellesmere's Trustees, (10) Sir Charles Henry Tempest, Bart., (11) Edward Petre, (12) Fylde Water-Works Company, (13) Colliery Proprietors, and South Lancashire and Cheshire Coal Association, (14) Leeds and Liverpool Canal Company.

Legal Intelligence.

HOUSE OF LORDS.—Tuesday, Feb. 5.

(*Before the* Lord Chancellor, *Lord* Hatherley, *Lord* Blackburn, *and Lord* Gordon.)

Hope *v.* the Local Board of Health of Romford.

This was a question as to the legal construction of an agreement for the disposal of the sewage of Romford, which agreement the plaintiff said he was induced to sign under what he considered false misrepresentations as to the number of houses connected with the existing sewers, and as to the amount of sewage available to be pumped on the farm of which he was tenant. In the Court below, judgment had been given against the plaintiff.

On the appeal, the plaintiff appeared in person. Counsel for the Romford Board of Health were not called upon.

Their Lordships held there had been no false or deceitful misrepresentations made by the Board which induced Mr. Hope to enter into the lease, and that the appeal must be dismissed with costs.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Chelsea Vestry.—At the Meeting of this Vestry on Tuesday, the 5th inst., Mr. Tully, inspector of mains to the London Gaslight Company, attended, and asked the Vestry to rescind a former resolution, passed on the recommendation of the Surveyor, prohibiting the laying of gas-mains under the footway in Pont Street, Chelsea. Mr. Lawrence said there was great danger from having pipes too near vaults, and he moved that the Vestry refuse to sanction any such arrangement. Mr. Forth seconded the motion. Mr. Cuthbertson considered that the Gas Company had a very good case. It was exceedingly inconvenient for shopkeepers to have the roads constantly taken up, and even if it were true that gas escaped from the main-pipes, the danger was but little removed by having them in the road. The motion was agreed to *nem. dis.*, and it was further resolved that the Surveyor should serve a written protest on the Gas Company, when, in his opinion, the pipes were not laid sufficiently deep.

Dr. Stevenson's report on the gas supplied by The Gaslight and Coke Company to the Vestry of St. Pancras, during the month of January, 1878:—Maximum light, estimated by sperm candles, according to the Act —18·8. Minimum light, sperm candles—16·7. Average light, sperm candles —17·6. Traces of ammonia, indicated by turmeric test paper—Traces on all occasions. Traces of sulphuretted hydrogen, indicated by lead test paper—None on any occasion. Sulphur 12·16 grains per 100 cubic feet of gas.

METROPOLIS WATER SUPPLY.

Metropolitan Board of Works.

At the Weekly Meeting on Friday last—Sir J. Hogg, M.P., in the chair—a deputation of inhabitants of the Borough of Southwark attended to present a memorial on the subject of provision being made in the Board's Water Supply Bills now before Parliament for a proper mode of charge to the consumers. The memorialists stated that they and their neighbours had for many years paid to the Southwark and Vauxhall Water Company fair and sufficient water-rates, fully amounting to, and in some cases in excess of, those charged by other Water Companies. The Company had suddenly, and without notice, charged an increased rate of from 50 to 400 per cent.—the average increase on 78 houses, taken from High Street, Southwark, and streets leading therefrom, being 125 per cent. It was contended that if the old rate was sufficient for some years to pay the Shareholders a good dividend, and, if the Company or their officers had by mismanagement or otherwise diminished the income or increased the expenses of the Company, the loss ought not to fall on the consumers. Especial attention was called to the basis of the charge for water-rates by the Southwark and Vauxhall Company—viz., the "annual value"—as being to persons using houses for business purposes, at high rents, an unfair and unreasonable method of fixing such rates. The memorialists were of opinion that the difficulty might be met if, in places of business, water were supplied by meter, with a minimum charge—say, 2 per cent.—on the annual value. As an alternative remedy, they suggested that where domestic and business requirements existed under the same roof, a separate valuation and ratal should be made in respect of each; or a plan simpler still would be to supply all houses by meter at a fixed price per 1000 gallons, the rate per 1000 gallons decreasing in proportion to the extent of the consumption. It was also asserted that the general irregularity of the water-ratal throughout the Metropolis demanded adjustment, inasmuch as there was no adequate reason why in some districts the charge should be 4 or 5 per cent., whilst in others it was only 1 per cent. on the value.

Mr. Gainsford, of the firm of Goode and Gainsford, addressed the Board, and stated that one reason why the deputation had been appointed was the belief that prevailed that the recent increase in the assessments had been brought about by the change proposed by the Board in respect of the water supply of the Metropolis, and they, therefore, pressed the matter upon the consideration of the Board, on the ground that whatever arrangement might be come to for the purchase of the Companies, the ratepayers, not only of Southwark, but of the whole Metropolis, would be made the victims of this new increased ratal.

In answer to Mr. H. L. Taylor, it was stated by Mr. Gainsford that the new precepts of the Company were issued in September last; that there had been no general re-assessment of the district, but that the additional rates had been imposed on individual houses at will. A deputation of 12 of the principal inhabitants had waited upon the Company, but the Directors declined to deal with them.

Mr. Richardson, addressing the deputation said: You understand that if we purchase these Companies we have to purchase their rentals.

Mr. Roche objected to the statement, which he said was not a proper one to be made publicly.

Mr. Dalton asked whether the deputation represented the Vestry.

Mr. Gainsford said they did not; they merely represented the trading community.

On the motion of Mr. Pocock, the memorial was referred to the Parliamentary Committee.

Communications from the Vestries of Rotherhithe and St. Olave's District Board, approving the Water Bills of the Board, were presented, and a letter in opposition to them was read from the Vestry of St. George-the-Martyr.

The Works and General Purposes Committee made a report stating that they had considered the notice from the New River Company of their intention to provide a constant supply of water in the Parish of Shoreditch, from Dec. 10, 1877, and the letter from the Company, requesting the Board to specify at what places, and of what dimensions and form they require the Company to provide hydrants in the parish, in order to give the public the full benefit of constant supply; and recommending that the Company be required to provide 12 hydrants at the points marked on a plan submitted with the report. They also recommended that, with reference to the notice from the East London Water Company, under the 34th section of the Metropolis Water Act, 1871, that a constant supply of water is now given within a certain district of their water limits, the Company be required to provide 12 hydrants at the points marked on a plan submitted with the report, and also that with reference to a similar notice from the Kent Water-Works Company, they be required to provide 12 hydrants at the points marked on a plan submitted with the report.

Meeting of Delegates.

The Delegates from the Vestries and District Boards of the Metropolis, whose meeting on the 28th ult. was adjourned, in order to allow sufficient time for their constituents to consider the resolution then proposed, reassembled on Friday last, at the Offices of the National Chamber of Trade, to take into consideration the water schemes of the Metropolitan Board of Works.

Mr. R. Attenborough, Chairman of the Executive London Water Supply Committee, presided, and, in opening the proceedings, stated that since the last meeting the matter had made considerable progress, and he scarcely knew whether they were then in time to exercise the influence on the Metropolitan Board that they intended. He was sorry to say that the Bill for scheme No. 2—for a duplicate system of supply, to which, he believed, 19 out of 20 of the ratepayers objected—had passed its second reading, and he imagined that they were out of court, so to speak, as to any opposition to that Bill in the House of Commons. He was informed by a member of the Board of Works belonging to the St. James's Vestry, that it was not the intention of the Board to proceed with the Bill irrespective of the other relating to the purchase of the Companies; but it appeared to him that they pressed on with it in undue haste, preventing the ratepayers having an opportunity of expressing their opinion. Of course, they were aware that this proposal of the second scheme had come upon the ratepayers since they had the opportunity of returning members to the Vestries or the Metropolitan Board of Works, and, consequently, the opinions of the ratepayers were not known at all on the second scheme. As regards the purchasing of the Water Companies interests, it was generally pretty well known what the feelings of the ratepayers were, and there was no doubt about the benefit of the supply of water to the inhabitants of the Metropolis being in the hands of a public body, devoted to the interests of the consumers, rather than in the hands of a variety of bodies having only a personal money interest. There might be doubts as to whether the purchase would not entail greater burdens on the ratepayers, but that was a matter of detail. How they could get the proposal carried out with advantage to the ratepayers was a subject on which they had to deliberate. A petition to the House of Commons had been drafted with reference to the matter, and would be submitted. With reference to the second Bill, they were too late to petition, but they might have an interview with the Parliamentary Committee of the Metropolitan Board. The first business before the meeting was a resolution to be adopted in regard to the proposal to purchase the Companies, and was as follows:—"That in the opinion of this meeting it will be to the interest of the ratepayers and the consumers that the undertakings of the several Water Companies should become the property of the Metropolitan Board of Works; but a limit, or the means of arriving at a limit, for the sum or sums to be paid for such purchase must be defined by the Metropolis Water-Works Purchase Bill, and a petition embodying this resolution be presented to Parliament."

The Secretary (Mr. Morrison) having read the petition referred to in and embodying the resolution, it was formally moved and seconded by the representatives of Kensington and St. James's, Westminster, respectively.

Mr. Fowler (Lambeth) whilst approving of the principle that the water supply should be in the hands of the Municipal Authority, pointed out that the Bill of the Metropolitan Board would require considerable modification, and amongst other matters to which he directed particular attention, were the obligations entered into by the Water Companies in order to obtain their present privileges—obligations which he thought had not been carried out. The Companies were to give a pure supply of water, to get filter-beds and impounding reservoirs, and generally to improve their supply. For this Parliament gave certain privileges, which built up the large dividends that were paid. If the Companies had not been able to do that which Parliament imposed, the fact should be taken into consideration.

Mr. Robins (St. George-the-Martyr) moved, as an amendment—"That, in the opinion of this meeting, it will be opposed to the interests of the ratepayers of the Metropolis that the undertakings of the Water Companies become the property of the Metropolitan Board of Works." He said the Metropolitan Board had broken faith with the ratepayers on other questions, and had plenty to attend to at present. He was of opinion that the Board were, therefore, the wrong parties to be entrusted with this duty, and that the present supply of water was sufficient, and might be obtained pure if the Acts of Parliament were put into operation.

Mr. Reed seconded the amendment, on the ground that the proposal was inexpedient and injudicious. The tendency towards centralization had reached a point at which it was becoming dangerous. The Metropolitan Board were not the body to undertake such a charge, and the way they dealt with other duties cast upon them, notably the Thames floods prevention, was not such as to induce confidence in them.

Mr. Bonthron supported the resolution. By waiting, more would have to be paid for the purchase of the Companies.

Mr. Cox (Lambeth) supported the amendment. He thought the Metropolitan Board had enough to do at present with artizans dwellings and other things.

After some further remarks, a division of the Vestries was taken, when it appeared that all represented were in favour of the resolution, except Lambeth and St. George-the-Martyr, and the representatives of Lambeth present were divided in opinion—four against and one for—and were not delegated by their Vestry to express the opinion of that body.

The Chairman announced that the Wandsworth Board had written, giving their approval to the resolution, and the Holborn Board declined to co-operate. The St. Pancras Vestry had taken action for themselves.

The resolution was accordingly declared carried.

The Chairman stated that, with regard to the second scheme of the Metropolitan Board, it was difficult to say what action should be taken. It would be a bad thing for the ratepayers if it were carried, entailing an expenditure of from six to eight millions, and involving the breaking up of all the streets for a scheme which might be utterly futile.

Mr. Liggins (Kensington) moved a resolution to the effect that the strongest opposition be offered to the Bill, and steps be taken to defeat it.

Mr. White (Lambeth) seconded the resolution. He said on that scheme they were unanimous. The scheme was totally uncalled for, and was only carried at the Board of Works by a majority of five.

Several representatives present said their Vestries were unanimous in opposing the scheme, and the resolution was passed *nem. con.*

Afterwards a deputation was appointed to wait on the Parliamentary Committee of the Metropolitan Board to present the resolution in regard to the second scheme, and, if the interview were unsatisfactory, to call another meeting of the delegates with the view of waiting on the Home Secretary.

The proceedings closed with a vote of thanks to the Chairman.

Opposition to the Metropolitan Board Water Supply Bill.

On Monday, the 4th inst., an influential meeting of the Millowners, Landowners, &c., in the districts around the Metropolis, was held at the City Terminus Hotel, Cannon Street, to consider the Bill of the Metropolitan Board for obtaining a supplemental supply of water for London by sinking wells in the chalk, and determine whether any or what steps shall be taken by them to oppose the Bill, with a view to protect their properties and interests. Mr. John Evans, F.R.S., of the firm of Messrs. Dickinson and Co., paper manufacturers, of Hemel Hempsted, presided; and there were present many riparian owners of the Wandle and Mole, in Surrey; the Ravensbourne, the Darenth, and the Dart, in Kent; the Rother and Lea, in Essex; the Colne, in Middlesex; and other interests were also represented.

The Chairman, in his opening address, said they had met, and many of them not for the first time, to devise means for the protection of rights now in their possession, affecting mills, lands, and property in general. On some former occasions they had had opposed to them small, incipient Companies; but in this issue they had a very different power to contend against—viz., the Metropolitan Board of Works, who were about to bring into Parliament two schemes for altering the water supply of the Metropolis. That body proposed to pump up from the chalk sufficient water for drinking and cooking purposes, and, by means of hydrants, at the same time supply enough for the extinction of fires—both supplies to be constant. The second proposal was to purchase the interests of the existing Water Companies. With the latter project the meeting had nothing whatever to do. But with regard to the other scheme, on which it was intended to spend a sum of £5,000,000 sterling, they had a great deal to say. The whole of the water to be taken was to be derived from new sources, and it was to be procured from districts where there was actually none to spare, not from the surface, but from underneath. From experiments he had made, he found that rain water—and most of the water they obtained was nothing else—did not percolate more than about three feet into chalk, and all who lived in a chalk country were pretty well aware of that. It was said that 16 million gallons of water would be required to be drawn per diem by the scheme of the Metropolitan Board, and, to give that amount, no less than 100 square miles of chalk country would be required. In fact, the whole quantity of water in the chalk must be drawn off. It was intended to have six pumping-stations, at Denham, Hayes, Keston, Epsom, &c., where the water would be drained away from the streams; and by having deep wells, those belonging to private owners would be emptied. The mischief would not be confined to those places mentioned by the Board, because,

if any difficulty arose in getting the required quantity of water, there would be no hesitation about going into other chalk districts to make it up. The Board would practically be establishing a system of freebooting, constituting it right at any time for large towns to go into country places and draw off all the water to be found, without any compensation whatever for the injury inflicted. Take it that 16 million gallons per day would be wanted for these two supplies, the question arose whether the present Companies could or could not give it. He unhesitatingly said they could, and the scheme for interfering with the water in other directions was, therefore, unnecessary and unwarrantable. The Kent Company, for instance, the water supplied by them being set down as pure, could give 9,000,000 gallons daily from the chalk; whilst the New River Company were in a position to afford, with their four chalk wells in full operation, 8,900,000 gallons, making together a total of 17,900,000 gallons, or nearly two million gallons more than the maximum quantity fixed by the Metropolitan Board of Works. As to the purity of water, he would just mention that Dr. Frankland reported that in some supplied from chalk wells there was more sewage contamination than in the Thames water as now supplied to houses, a fact due to the natural infiltration constantly going on from that river. After compelling many parties to go to an immense expense in drainage works, to ensure the purity of the Thames, the Metropolitan Board turned round and said they could not use its water, but must lay out an enormous sum to obtain that commodity from the chalk districts. In conclusion, he designated the Bill as framed in such a manner that it would, if passed into law, confer a power to make raids on private property both unconstitutional and unjust. He was heartily glad to see that so many, deeply interested as they were with himself as well as some of the London Vestries, had come forward to express their strong dissent to the Bill, and were determined to oppose it to their utmost, as one of the most reckless attempts to waste public money ever devised.

Mr. W. FOWLER moved the first resolution. In doing so, he said, as he understood, they had been called together to protest against the water, which was so valuable to them, being taken away unless ample compensation was given in return. As a trustee to property affected, he thoroughly dissented from the Bill, and moved—"That the whole of the water proposed to be pumped from the wells to be sunk under the authority of the Metropolis Water Supply Bill will be abstracted from the springs, feeders, and waters of the chalk district around London, to which the Metropolitan Board of Works have no right whatever."

Mr. PODGER seconded the motion, which was supported by Mr. SPENCER, and adopted unanimously.

Mr. A. G. HOPE moved, and Mr. H. MERCER seconded, the following resolution, which was also unanimously adopted:—"That the proposed fresh sources of supply are needless, inasmuch as the existing Water Companies, whose properties the Metropolitan Board of Works purpose to acquire under another Bill, are capable of supplying an equal quantity of water derived from the chalk, and of the purity and quality required."

Mr. WARD moved the next resolution, which, seconded by Mr. HENDERSON, and adopted, was as follows:—"That though in the proposed Bill the sinking of wells is limited to certain parishes in the counties of Bucks, Middlesex, Surrey, Kent, and Essex, there can be little doubt that should the supply prove insufficient, a similar attack on the rights of property will be made in other places around the Metropolis."

Rev. J. C. CLUTTERBUCK moved—"That the operations of the Metropolitan Board of Works would inflict immense injury on the owners and occupiers of land, and proprietors of wells, in the neighbourhood of the spots where the new wells are to be sunk, as well as on the owners and occupiers of mills along the course of the streams from the sources and waters of which 16 million gallons daily are to be abstracted." He said he recollected a company being formed in the year 1840, to which the late Mr. Robert Stephenson was Consulting Engineer, the object being to draw 8 million gallons of water per day from a chalk district, but it was found impracticable, and abandoned. Many people still believe that Liverpool had an abundance of water, and that it was easy to get it from the red sandstone. That, however, had proved a delusion, and he ventured to predict the same result if the experiment was now made with chalk. Besides, it was their duty to resist anything which tended to depreciate the importance of their water power, which would yet be found to be most useful and necessary in the country.

Mr. IBBOTSON seconded the motion, which was carried unanimously.

Baron DIMSDALE said that the meeting had nothing to do with the scheme for purchasing the existing Water Companies, although he, for one, was opposed to it. What they had to look to was the scheme to abstract the water from the chalk for many miles round London, and he believed the House of Commons would not let the interests of a large class of the community suffer in the direction proposed, and suffer, as the Chairman had explained, most needlessly. He moved the last resolution, as follows:—"That an Association be formed for the purpose of opposing the Metropolis Water Supply Bill about to be brought into Parliament by the Metropolitan Board of Works, and that a Committee be appointed to arrange and receive subscriptions, and conduct and manage the opposition to the Bill."

Mr. MERCER seconded the motion, which was adopted, and a Committee were formed, with power to add to their number.

A petition to Parliament, in opposition to the Metropolis Water Supply Bill, was handed round for signature, and a vote of thanks having been passed to the Chairman, the meeting broke up.

VESTRY OF ST. PANCRAS.—The Clerk to this Vestry has issued the following letter addressed to the various Vestries and District Boards:—

Vestry Hall, Pancras Road, Feb. 2, 1878.

Metropolis Water Supply Bills.

Dear Sir,—As you are aware from my previous circulars, the Vestry of this parish have determined to oppose the scheme of the Metropolitan Board of Works with reference to the Water Supply of the Metropolis, and a petition (a copy of which was sent to you on the 19th ult.) has been presented to Parliament against the Board's proposals.

The Committee of this Vestry, who are conducting the opposition, without wishing to dictate in any way to your Board, whether in favour of, or against the Water Supply Scheme, are very desirous to draw attention to a most important point which not only affects this question, but every measure to be hereafter promoted by the Metropolitan Board of Works, as controlling the rights and privileges of Vestries and District Boards.

Two Bills are being promoted by the Metropolitan Board. Neither of these is promoted with the unanimous approval of the Board, and one of them by only a small majority. The Vestry of this parish having determined to oppose, petitioned Parliament accordingly, praying to be allowed to state their objections. This action of the Vestry is met by the Metropolitan Board objecting to the Vestry's *locus standi*, and the grounds put forward for such objection are stated in the notice from the Board to be—

1. Because the Metropolitan Board of Works, and not the Vestry, are the authority *for the local management of the Metropolis.*
2. Because the Vestry are represented at the Metropolitan Board of Works, and the Vestry have no interest, distinct from other parishes and districts, which entitles them to be heard.

With reference to the first objection, my Committee wish it to be pointed out to your Board that the assumption on the part of the Metropolitan Board is not warranted by fact, inasmuch as there is a far larger share of the local management of the Metropolis in the hands of the Vestries and District Boards than in the hands of the Metropolitan Board. The Vestries and District Boards being the authorities for house drainage and sewerage (except certain main sewers), for cleansing, paving, lighting, and watering streets, removal of house refuse, nuisance removal, food and drugs analysis, and many other purposes.

As regards the second objection, the Committee wish also to point out to your Board that, although the Vestries and District Boards elect the members of the Metropolitan Board, these representatives are not under the control of the electing bodies, but properly exercise their powers according to their own views; and, moreover, a large minority of the Board may be, and in this instance have been, strongly opposed to the action of the majority.

On the point that the Vestry have no interest distinct from other parishes which entitles them to be heard, the Committee see how this assertion, if admitted, may be made to apply to every Vestry and District Board in the Metropolis, and so leave those bodies without the power of approaching Parliament against any scheme, however objectionable, which may be promoted by the Metropolitan Board.

The Committee think, therefore, that the determination on the part of the Metropolitan Board of Works to prevent the Vestries and District Boards being heard in opposition to their scheme, is one which, apart from the particular question involved in these Water Bills, deserves the serious attention of the Local Authorities of the Metropolis.

My Committee have therefore determined to convene a meeting of representatives from the several Vestries and District Boards:—

1. To consider the objections put forward by the Metropolitan Board of Works to the Vestry of St. Pancras, and (having regard to the points above enumerated) to any other Vestry or District Board being heard by a Parliamentary Committee against the Board.
2. To ascertain the views of the Vestries and District Boards as to whether the Water Supply Bills should be proceeded with by the Board.
3. To consider whether the Vestries and District Boards, who have determined to oppose the two Bills, or either of them, should adopt some joint course of action, with a view to secure *locus standi* before the Committee on the Bills, and against the action of the Metropolitan Board.

The Conference will be held in the St. Pancras Vestry Hall, on Friday, the 15th inst., at four o'clock, and representatives from your Board are invited to attend.

(Signed) THOS. ECCLESTON GIBB, Vestry Clerk.

NORWICH WATER-WORKS COMPANY.

The Half-Yearly Meeting was held on the 30th ult.—Mr. H. S. PATTESON in the chair.

The CLERK (Mr. R. Cooper) read the following report of the Directors:—

The accounts of capital and revenue for the half year ending the 29th of September last, now read, have been carefully investigated by the auditors, who have certified to their correctness in the usual manner.

After payment of working expenses, debenture interest, and dividend on the preference shares, and including the balance from the previous half year, there remains a sum sufficient to pay a dividend on the ordinary shares at the rate of 6 per cent. per annum, deducting income-tax, leaving a sum of £491 16s. 11d. to the credit of the next half-year's account. The Directors have, therefore, declared a dividend at that rate, which will be paid to the Shareholders on the 1st of February.

The Directors who retire by rotation are Messrs. Henry Woodcock, William Cadge, and Alexander Robert Chamberlin, who, being eligible, offer themselves for re-election.

A resolution will be proposed at the special meeting to be held this day, authorizing the Directors to raise £20,000 of ordinary share capital, and also to borrow or raise the sum of £5000 on bonds or on mortgage, in pursuance and under the authority of the Company's Act of 1876. The Directors propose to offer the shares by public auction, under the power given by the Act of Parliament, at different periods, as the money may from time to time be required; but the £5000 will not be borrowed till the whole of the £20,000 of ordinary share capital is raised.

In conclusion, the Directors have the satisfaction of assuring the Shareholders that the works are still maintained in the most complete order and efficiency.

The CHAIRMAN, in moving the adoption of the report, said the accounts of the Company were in a satisfactory condition. The customers of the Company were increasing, applications were constantly received for extensions, the water was generally approved of, and the works were in first-rate order. The fact that the law expenses of the Company for the half year were only 14s. showed that they conducted their business peaceably.

Mr. BACON seconded the resolution, which was unanimously adopted.

The retiring Directors and Auditor having been re-elected,

The meeting was made special.

The CHAIRMAN said that in 1876 the Company applied for an Act of Parliament, one of the chief objects of which was for raising fresh capital, as the Company's capital had been almost entirely expended. The Company were constantly receiving applications for further extensions, but it was impossible to make these without more capital. By the Act of 1875, the Company had power to raise £80,000 as ordinary share capital, with borrowing powers of £20,000. What was now wanted by them was authority to raise £20,000, and £5000 under borrowing powers. That amount when raised would not be expended for some time; it would, in fact, only be asked for as required. In answer to a question, why those shares should not be apportioned among the Shareholders generally, the Chairman said, one reason was that the Directors thought every one should have a chance of taking them up. Of course, the premiums they made went to the benefit of the Shareholders. In the second place, there were many Shareholders who would find it inconvenient to take up shares.

Mr. MAGUIRE asked whether it would be advisable to increase the number of Shareholders.

The CHAIRMAN said that the more persons there were brought into the Company the more friends they would have. The feeling of the Directors was that the Company could not be too much extended. The profits obtained by premiums on shares sold up to the present time was £4110.

Mr. PYMAR said the Shareholders obtained no advantage by that, as the Company could not pay more than 6 per cent.

The CHAIRMAN replied that the Shareholders had been benefited indirectly, because 6 per cent. had not been paid until lately.

The CLERK explained that if the proposed shares were not offered to public auction, but were allotted among the present members, the benefit to each Shareholder would be very small. If the sum wanted was £20,000, £30,000, or £40,000 in one sum, the division of the amount among the Shareholders would be some object. But the Company would probably not take up more than £5000 at a time, and that, divided among the Shareholders, would give to each a benefit that would be infinitesimal.

The CHAIRMAN moved—"That the Directors be and they are hereby authorized, from time to time as they may deem expedient for the purposes of the Company, to raise additional capital by the issue of 2000 ordinary shares of £10 each, such shares to be offered for sale by public auction, under the power given to the Company by the City of Norwich Water-Works Act, 1876. And also to borrow and raise the sum of £5000 on bonds or mortgage, in pursuance and under the authority of the said Act."

Mr. BACON seconded the motion.

Mr. AYRES, the Company's Engineer, said, in answer to several questions, that the Directors asked for power to raise this money from time to time as they required it. Only that morning a kind of indirect application came from the Thorpe Asylum for a supply of the Company's water. The Directors must at once have the power to entertain that application, which would involve considerable expenditure. Another thing which he, as the Manager of the works, was obliged to force on the Shareholders attention, was the necessity of an enlargement of the works at Heigham. When the engines, which were still in perfect order, were put in in 1859, the income of the Company was less than half of what it was now. From day to day owners of houses applied for extensions of the Company's mains and pipes, and it was the duty of the Company, as well as their interest, to keep the works ahead of the requirements of the district, otherwise they would soon come to grief. The Directors would, therefore, be obliged shortly to bring before the Shareholders plans for the enlargement of the works at Heigham. These plans would be carried out in the

course of two or three years. Although the cost of this enlargement would, in the end, be something considerable, yet the money would only be spent from time to time as it was wanted, in order not to put in jeopardy the present dividend. His strong advice to the Directors as to the shares was, that they should be put up to auction. A large number of proprietors would not take additional shares.

Mr. MAGUIRE asked what prospect there was of the Company being taken over by the Corporation.

Mr. AYRES did not think there was any chance of that. He was now defending the Stockton and Middlesbrough Company, whose works it was proposed that the Corporations of those towns should acquire; but as it seemed likely the Corporations would have to pay the piper heavily, he did not think other Corporations would follow the example.

The resolution was then unanimously adopted.

The thanks of the Shareholders were then given to the Directors for their admirable conduct of the affairs of the Company.

Mr. PYMAR then moved, and Mr. DIX seconded, a vote of thanks to the Manager, Mr. Ayris, for his energetic efforts in behalf of, and watchfulness over, the interests of the Company, and this having been carried, concluded the business.

PROPOSED PURCHASE OF THE WORCESTER GAS-WORKS.

At the Monthly Meeting of the Worcester Town Council, on Tuesday, Feb. 5—the MAYOR (Mr. F. Dingle) presiding,

Alderman WOODWARD submitted the following motion:—"That the Watch and Lighting Committee be instructed to negotiate with the Worcester Gas Company for the purchase of their works and property in consideration of an annual payment to each Shareholder, based on the maximum dividend to which he is now entitled." In doing so he said the Gas Company were established in 1846, to supply good and cheap gas, and that they were limited to a dividend of 10 per cent., and a capital of £35,000. There were two Acts of Parliament, one of 1846, and one of 1848, and the borrowing powers of the Company were limited to £10,000. The last clause but one in the second Act stated that, when the consumption amounted to 30 million feet, the price should not exceed 5s. 6d. per 1000 feet; and it went on reducing the price up to 48 millions, 6d. for every 5 million feet, thereby clearly indicating that the Legislature contemplated that, as science advanced, and the cost of production decreased, the price of gas also should decrease. Something had been said as to the cost of gas supplied by private Companies in comparison with Corporations. He had taken some pains to ascertain, from a report prepared by the Lighting Committee on the purchase of gas-works by Corporations, the facts with regard to a number of towns, as nearly analogous to Worcester as possible, which were at the present moment supplied by gas provided by Companies, and he found the result to be this—that Worcester was supplied with gas of 22½ per cent. less illuminating power than the towns he had selected; that the public lamps were charged 22½ per cent. more, and that the price to the public was 27½ per cent. more. If they took it in another form, they would find that other towns were selling their gas at 2¾d. per candle, while in Worcester they paid 3½d. He had taken 14 towns supplied by Corporations, and he found that the illuminating power amounted to 17$\frac{5}{16}$ candles, that the price for that gas was 3s. 4½d. per 1000, and if they calculated the cost per candle they would find the Corporations supplied the candle at 2½d., while the Worcester Private Company supplied the citizens at 3½d., or someting like 40 per cent. more. Something had also been said about the illuminating power of the gas supplied by Corporations as compared with that of gas supplied by private companies previous to the former acquiring the works; and he found it to be this—that the Companies (taking towns as nearly analogous to Worcester as possible) supplied gas of an illuminating power of 13 candles, and the Corporations supplied gas of an illuminating power of 17$\frac{10}{16}$ candles Most of the Council would remember with what a tearful face some of the Directors and Shareholders came to the Corporation and asked for an increased price for the gas supplied to the city, in consequence of the increased price of coal. The Corporation always had consideration for those who were in trouble and difficulty, and they met them in the most handsome and liberal manner; but what did he find in the Gas Company's own accounts? He found that in the year 1875 the cost of coal was £10,080, and the gas sold realized £16,277; while, in 1876, the cost of coal being £8486, the gas sold realized £17,746; and in 1877, the coal costing £9024, the gas sold amounted to £18,291. Thus, after allowing a difference in favour of the Gas Company of £1594 in coal alone, comparing the first and second years, the increased production of the lower cost of coal gave in 1876 an increased profit to the Company of £1469, making with another item of £517 for residual products, £3580 profit to the Company upon the decreased cost of coal alone. While for 1877 the decreased cost of coal, compared with 1875, was £2056, the increased profit £2014, on an increased consumption of gas, and the residual products £184, made a total of £4218! And after that the Gas Company told the Corporation they were unable to reduce the price of the public lamps because their profits were so small! It had often been stated, and very likely there might have been some reason in it, that private Companies managed their business much more economically than Corporations did. Well, he had taken the quiet and unpretending little city of Hereford, and made a calculation as to the relative cost of production there and here. In Worcester it cost 65 per cent. of the gas sold. Hereford had lately acquired the gas-works there, at an enormous cost, but what did they learn? The result was that last year, after paying all interest and providing for the sinking-fund, they had a net profit on the year's trading of £2405 7s. 9d. After referring to the contingencies to which Gas Companies were exposed, he concluded by expressing his opinion that the Shareholders of the Worcester Company would do wisely to consider and accept the offer of the Corporation for the purchase of their works.

Alderman JONES seconded the motion. He believed that with the progress of science before them, and the advantage that the public would derive, and the security that the Shareholders would have, no one could see the slightest objection to the resolution. Referring to the report from which the mover had quoted, he said that, taking the case of the very smallest town, Aberavon, and the large towns of Birmingham and Leeds, it would be no mistake to ask the arrangement in question at the hands of the Shareholders. Gas was looked upon, in a very great measure, as public property, inasmuch as there was a very great deal consumed by and for the public. He did not apprehend that the Council would endeavour to wrest the profit of the business out of the hands of the Shareholders. But the time seemed to him to have arrived when it would be advantageous to the Shareholders, and undoubtedly so to the public, to make the transfer. Some might say that the Council were not able to give a large price. What mattered about figures if they got the works at a fair price? Having referred to the large profits made at Birmingham and elsewhere, and the advances which science was making, the speaker said there could be no doubt how the Council would stand in relation to the exchange.

Mr. BOZWARD said that, although elaborate figures had been presented to the Council, comparing Worcester with other places, it had not been shown, if the Council paid the value of the Gas Company's works to the Shareholders—such as they would be entitled to receive—what profit would result to the citizens. The saying, "Nothing extenuate, nor set down aught in malice," should be observed. He did not mean to say that anything had been set down in malice; but everything done on the part of the Gas Company had been passed over, and nothing had been said about the great and important services which the Company had conferred upon the public of Worcester. He maintained that the Company had fulfilled the promise which was held out to the city to supply good and cheap gas. The old Company charged the city 8s. 4d. per 1000 feet for their gas, and at this moment the price of gas was lowered to no less than 3s. 3d. per 1000 feet. Therefore he ventured to say that the Company had fulfilled literally and exactly all the promises which they made when they went to Parliament to institute the new Company. As to the illuminating power of the gas, he submitted that the burner with which the gas was tested was not the standard one which had been used in other places; the burner which the Council had was an unfair one towards the Company, and he challenged contradiction. If they had the proper burner, such as that which tested the Birmingham or Manchester illuminating power, the Worcester gas would be found to be as good as that of any of the places specified. It ought to be known that when the gas-works were transferred from the old Company to the present Company, the only public body which could have taken to those works were asked to take to them, and deliberately declined. Let the Council just consider what immense service the Shareholders had performed to the city—finding that no public body would take up the works as a public enterprise, the Shareholders took them up and stood in the gap which nobody else would fill, and had since performed all that they promised to do. Having referred to the difficulties which the Company originally encountered, and to the fact that their present prosperity resulted from successful management, he argued upon the point of increased illuminating power, comparing the present with the old Company, when

Alderman JONES interposed, and said there had been no reflection cast upon the Company.

Mr. BOZWARD said he thanked Alderman Jones for this reminder, and at once called attention to the fact that no body of citizens had complained of the gas supplied, or the price charged—only one or two people in the Council had complained. So the Council were not called upon by the citizens to sit in judgment upon the Gas Company—the citizens were satisfied both with the price and the illuminating power. He thought that the Council ought not to move in such a great matter as this unless they had behind them the support of the city. Alderman Woodward was disposed to think that the Shareholders would take annuities for their property; but did the Council suppose for one moment that the Shareholders would listen to anything of the sort? Nothing of the sort. He estimated that the cost of the works would be £150,000. Where were the Council to find the money for their purchase, and if they got the money, what profit would remain after paying that sum? Having referred to the cost of extensions, he observed that it was said profits had been realized in other places. He wished to point out that if the Council were to propose to repay the money borrowed they must increase the price of gas to consumers to enable them to do so; because at present the Gas Company did not propose to pay off their Shareholders. The Council would have to pay a dividend *plus* payment of the debt. Having reminded the Council, as regarded the expenditure of profits in extensions and works, which the Company had been blamed for, that this was the very thing which, if the alteration were carried out, the Council would do, he said that the real sin of the Gas Company was that it was a successful concern, and he asked if it was fair, therefore, that any gentlemen should get an Act of Parliament and, as a person would put a pistol at another man's head and say, "Your money or your life," say to the Gas Company, "This thing is a very good one, too good for you any longer." In conclusion, he maintained that no valid grounds had been given for the Council's interference with the works; that to do so would be to plunge the city in debt to an enormous extent for an exceedingly doubtful benefit; that it would be most unwise to add to the work of the Council by their becoming traders in gas; and that by no scheme could the city be supplied with gas at a cheaper rate than at present.

Alderman LONGMORE, referring to the figures which had been quoted, said it was impossible, on a sudden, to come to a decision as to which were right and which were wrong. The whole argument of Alderman Jones went to this—that it would be a benefit to the Gas Company and the Shareholders to sell. But would it be a benefit to the city to buy? That was the position of the Council—it was for them to consider, not whether it was to the Shareholders advantage to sell, but whether it was to the advantage of the city to buy. Having remarked upon the small number present at the meeting of the Watch Committee when the resolution now before the Council was adopted, he pointed out that what Alderman Woodward and Alderman Jones had said regarding the progress of science was really a strong argument against the Council making the purchase. Then, taking the case of Hereford, he mentioned that whereas the price of gas used to be 4s. per 1000 feet, less 6d. discount, the Corporation were now charging the same price, less 3d. discount only, so that private consumers were now paying more than formerly. The Worcester Company had, in accordance with their Act of Parliament, reduced the price, from time to time, to the private consumers. And now, looking at the price charge in surrounding places, he thought the people of this city were not paying, at any rate more, but on the average less, than many places. He did not hear any complaint from outsiders of the price charged, and he saw there was a notice that the present price would be reduced still more. He did not think there was much reason to complain. The concern had been excellently managed. How would it be managed under the Corporation? He was fearful of that—fearful of running the risk—and, taking it altogether, he thought they would have a majority in accordance with the view that he held—that they had better, if there were ills, "Bear the ills we have, than fly to others that we know not of." Therefore he should vote against the motion.

Alderman WILLIS, with the view of shortening the discussion, suggested that, if the motion were carried, a committee could be appointed to treat with the Gas Company for the purchase of their works. The arguments would come better when the Council knew the result of the interview with the Company; then they would have to deal with the price asked by the Company, and discuss whether it was advisable to purchase or not. He should be quite content to buy at market value—that was, the price shares were valued at in the market; but if the Council should think it advisable to purchase the works at a valuation, or by arbiration, he should strongly oppose it.

Alderman JONES said he had been incorrectly quoted by Alderman Longmore. He distinctly said, in reference to the advantage to be derived by the ratepayers, that they had only to refer to the smallest town, and two of the largest mentioned in the report, and there they got the profits indisputably before them. He directed his remarks upon the two questions.

Mr. AIREY said he had hitherto been in favour of towns of any importance being in possession of both water and gas works, but he admitted his views had undergone a change. Scientific discoveries were becoming such that what might have been desirable 20 years ago might be undesirable to-day.

He should be sorry to give a vote to-day for the purchase of the gas-works, and find, six or twelve years hence, another artificial light entirely superseding gas, and that the gas-works, the property of the Corporation, had become a comparatively useless property. He was reluctant to say it, but not having before him information which he should like to have, he should be compelled to give his vote against Alderman Woodward. He hoped the Council would pause. There were a great many very clever men who certainly thought gas would be superseded. A very influential member of the Council (Alderman Hill) had expressed that idea, and he thought the Council should seriously consider what they were about. A little delay would be a wise policy—they could see what transpired—they were not taking any great harm under the present system.

Alderman LOVSEY said he was opposed to any further delay. Mr. Bozward had tried to alarm them with figures; but if the gas-works were worth the sum he had stated (£150,000), how did he account for their present value, if justice had been done to the gas consumers? The Company had a paid-up capital of £35,000 (£25,000 in shares and £10,000 borrowed), and taking the full sum of this capital (£35,000) the Committee recommended the Council to pay 10 per cent. upon it; that was all that the Shareholders were entitled to under their Act of Parliament. Beyond all question, if the value of the works had been increased to the sum which Mr. Bozward had stated, could the Council doubt for a moment that the price of gas might have been reduced years ago? If they wanted extensions of the works, the Company should have adopted the system which was carried out at Plymouth—asked for increased borrowing powers, and got increased capital, on which they paid 5 or 6 per cent. At Plymouth they had, he believed, four classes of shares, and they had carried out faithfully the principle of their Act of Parliament. There the present price charged was 2s. 3d. per 1000 feet, and £2 10s. for the public lamps. At Worcester they were paying 4s., for every man was not in a position to pay in accordance with the terms of the Gas Company, and therefore, because a man was poor, he suffered an injustice. According to their Act of Parliament, the Company were only entitled to charge 5s. 6d. per 1000 if the consumption reached 30 million feet; and the price was to be reduced, when it reached 48 millions, to 4s. per 1000; but from that period down to the present time it had remained at 4s. per 1000. The consumption last year was over 93 million feet; so that the public got a reduction of 1s. 6d. per 1000 between a consumption of 30 and 48 millions, but between 48 and 93 millions there was no reduction, unless they paid in advance with the Company's terms. He (Alderman Lovesey) submitted that if 1s. 6d. was taken off between 30 and 48 millions, surely a reduction should have been made between 48 and 93 millions. And when they remembered the improvements which had taken place in the manufacture of gas, and also that the value of the residual products had increased, they had a right to expect a reduction of price, in proportion to the consumption, below 4s., the price when the consumption was 48 millions. Mr. Bozward made a great mistake when he said there was satisfaction amongst gas consumers; that was not so, either as regarded the price or the light given. Other towns were getting 16 and 17 candle light; Worcester only 12—12 was in the Corporation contract with the Company. The question was pure and simple: Had the Act of Parliament been carried out in the way that the public had a right to expect it to be carried out? Had the profits, after providing for 10 per cent. on the shares, and £5000 as a contingent-fund, gone year after year in reducing the price of gas? He asserted that this had not been done, and that it was right the public should have the very great profits that had arisen. Thirty years ago there was not half the population, and not one-quarter the gas consumed as at present, and Parliament recognized the principle that with all Companies, in proportion as the increase took place, the price should be reduced.

Mr. NOAKE said the Corporation already had so many "irons in the fire" that it taxed their best energies to perform the work they already had in hand, and they could not do that without meeting two or three times a month; and if they were to be saddled with the enormous business proceedings connected with the gas production of the city, he did not know how the work of the Corporation was to be carried on. Another committee would have to be formed; the Council would have to overhaul the proceedings of that committee from time to time, and the consequence would be that they would find themselves in a quagmire. He had great doubts as to the management of a colossal undertaking of this kind by the Corporation, and he was not the only gentleman who had legitimate doubts in that way. He quoted the opinion of several Town Clerks (given in the report), and went on to say that in face of the wonderful improvements and discoveries which were being arrived at, the Council should not undertake to purchase the property of any company at its maximum value, or guarantee the present Shareholders 10 per cent. per annum for ever, when, perhaps, in the course of two or three years, that property would be comparatively valueless. Looking at recent discoveries, and at the prospect that in future years gas would be superseded by some other means of illumination, he thought it was not the interest of the public to purchase. He should have thought the proposition would have originated, not from any Member of the Council, but from the Shareholders of the Gas Company, for certainly the proposal tended to perpetuate the maximum value of the property for ever and ever. It was a most amusing argument that this was an admirable time for the Shareholders to sell, and that they would be wise if they sold; but, by parity of reasoning, if they would be wise to sell, the Council would be acting unwisely in purchasing. The argument cut both ways, and his advice was that it would be much better to "let well alone." If the Gas Company knew their best interest they would from time to time condescend to make as many reductions in the price of gas as would be sanctioned by the condition of their finances and their returns; but, as one of the representatives of the ratepayers of the city, he (Mr. Noake) could certainly never consent to put an everlasting burden upon their shoulders. He hoped that the Council would pause before they committed themselves to any resolution.

The TOWN-CLERK explained, with reference to Mr. Noake's assertion, that the ratepayers would be saddled with a payment "for ever," that if the Council purchased the gas-works they would repay a portion of the principal every year, and that probably the whole would be repaid in 60 years.

The CHAMBERLAIN expressed the opinion that, if coal gas was to be the means of lighting generally used, it would be advisable for the city to become purchasers of the gas-works upon the terms which had been proposed by the proposer of the resolution; but, as had been intimated by other speakers, there seemed to be a great prospect that gas would be superseded, and he was sorry to say that he should not be able to vote for Alderman Woodward's resolution—on this ground, that, only during last week, at the Institution of Civil Engineers, a paper was read upon this very subject, in which several instances were given of large establishments in which other means of lighting than gas were adopted, and it was distinctly stated, and admitted, that in point of economy either the electric or the magnetic light—the magnetic, he believed—stood as two to one, compared with coal gas, and, in point of lighting power, twenty to one in favour of the magnetic light! With those facts before them, which were not denied when the paper was read, he did not think the Council would be wise in agreeing to become purchasers of the gas-works at the present time. He should be very glad if this resolution could be deferred until some further discussion had taken place upon other lights by engineers who had the subject in hand.

Mr. PARTINGTON suggested that the Council should postpone their decision until they knew the feeling of the citizens generally. Then they would be in a better position to know what to do.

Mr. SCOTT also suggested the withdrawal of the motion for the present.

Mr. LECHMERE-PUGH moved as an amendment to the motion—"That a deputation be appointed to wait upon the Directors of the Worcester Gas Company to ascertain if they are willing to sell their gas-works to the Corporation, and, if so, upon what terms."

Mr. RUSHTON seconded the amendment.

Alderman STALLARD failed to see that it had been shown in the report that the public or the private consumers were dissatisfied either with the present price of gas, or the quality, or the quantity, or, in fact, with anything that the Gas Company had done. Therefore, he was surprised to find that Alderman Woodward was pursuing the same tactics that he followed a few years ago, and made assertions against the Gas Company as to their not supplying sufficient light at a sufficiently low price. That had been followed up by Alderman Lovsey in no unmeasured terms, some of whose statements he could not at all endorse. Referring to the statement that the Company only supplied by contract 12-candle light——

Alderman LOVSEY disclaimed anything unfair.

Alderman STALLARD said the return of the Corporation officer would show that by the test at the Guildhall, which was against the Company to a great extent, the average was over 14 candles. The speaker then detailed much of the information given in the report, and on the point as to there being a probability of the price of gas being further reduced if the works were in the hands of the Corporation, he said that the effect of this would be unfair; 2000 people who consumed gas would have the benefit of the reduction, while 6000 or 7000 who were not consumers would not get that advantage. Some Corporations kept up the rates to make a profit, but that, he begged to say, was directly in opposition to the wording of the Company's Act. The gas-works were established by gas consumers, and they took good care to have in that Act a protective clause; and the terms of the Act were these—first of all the works were to pass into the hands of the new Company, for the purpose of affording to Worcester and the suburbs a much larger and better supply; that was done, and after that the Company were restricted in price, as Alderman Lovsey had said, until it got down to 4s. After that, let them bear in mind, the restriction ceased. Dealing with Alderman Lovsey's statement, that the Company were now charging 4s., the speaker reminded the audience that the Company, though charging that figure, only received (allowing discount) 3s. 6d. That might be thought by some to be no advantage to the gas consumers, but the Company had been at a disadvantage of £2000. The speaker went on to refer to Hereford, saying that the price of gas had increased there, and that they wanted to borrow £10,000 to extend the works, in order to meet the requirements of the city. The main question, no doubt, was that the Council wanted to get hold of what was a profitable speculation, and there was no doubt if it had been unprofitable they would have heard little about it. And if they were going to apply whatever profits were made to the reduction of the rates and the improvement of the city, they would be doing so to the disadvantage of the gas consumers. They had just as much right to apply any profits they might make from water to these purposes. He complained that the information in the report was not nearly so full as it ought to be. They ought to have had the length of the mains, the number of the public lamps, the price paid for coal, whether there was a large consumption by day as well as by night as in all large manufacturing towns, who erected the lamp-posts and provided the lamps, and who lighted and extinguished them. At Birmingham the old Company's prices 10 years ago were from 2s. 5d. to 2s. 9d. per 1000 feet, and now, under the Corporation, it was from 2s. 9d. to 3s. 4d., while at Macclesfield the price had risen from 3s. 6d. to 4s. He did not know whether the Corporation could purchase the gas-works without having an Act of Parliament, but he was prepared to say that the Company were not in a position to sell without one.

Alderman WILLIS suggested a postponement of the question for a month, so that in the meantime, if the public liked to take the matter in hand and give their opinions as to whether it was advisable to purchase the gas-works or not, they would be better prepared to vote upon the question, and settle it once for all.

Mr. GOLDINGHAM appealed to the Council not to again postpone the matter. He for one had come to the meeting perfectly prepared to vote, and he was sure his constituency would uphold him.

The SHERIFF had heard nothing showing that the purchase of the gas-works would be to the interest of the ratepayers of the city. All the extensions and works would have to be paid for out of the general rates, and he considered that would not be fair to the non-consumers of gas. He thought that the Gas Company had acted very judiciously in not raising large capital, when they might have done so.

Mr. BOZWARD reminded the Council that out of the 1300 gas companies in the kingdom, the public bodies who had taken over the gas-works might be counted upon one's fingers.

Alderman LOVSEY said the charge some four years ago for public lamps was £3 3s., and then it was raised to £3 10s. He hoped the Company, at their next meeting, would reduce the charge for the lamps to the old price, and so benefit the rates of the city by £200—rates which had to be paid by the poor as well as the rich.

Alderman WOODWARD having replied, consented, with the approval of the seconder, to withdraw his motion.

The Council then divided upon the amendment—to appoint a deputation to confer with the Gas Company as to their willingness to sell. The amendment was carried by 17 to 8, the members interested in the gas-works abstaining from voting, and a Committee of six was appointed to form the deputation.

WHITBY WATER-WORKS COMPANY.—The annual meeting was held on the 5th inst.—Mr. Thos. Thistle presiding. The revenue account for the year showed a disposable balance of £1762, and the Directors recommended a dividend of 9½ per cent., or 19s. per share, on the fully paid-up shares, and 9s. 6d. per share on the shares on which £5 is paid, free of income-tax. This left a balance of £96 3s. 6d. to carry forward to credit. The Chairman moved the adoption of the report and declaration of dividend, which was carried unanimously.

SCARBOROUGH WATER COMPANY.—The *Leeds Mercury* says: "An unopposed Bill to enable the Scarborough Corporation to acquire the local water-works from the Water Company is now passing through Parliament and awaits second reading. In the event of the Corporation agreeing to buy the works at 25 years purchase upon the maximum dividends allowed the existing Company—the terms required by the Directors—the Corporation will then have to decide whether they will carry out the gravitation scheme propounded by Mr. Filliter, C.E., of Leeds, for obtaining a fresh supply. They have instructed Mr. Hawksley, C.E., to inquire and report upon the merits of this scheme."

YORK UNITED GAS COMPANY'S BILL.

Renewal of the Opposition.

A Special Meeting of the York City Council, convened by the requisition of ten members, was held on Monday, the 4th inst., for the purpose of adopting a petition to Parliament against the Bill of the York United Gas Company. The Lord Mayor presided.

The Town Clerk read a letter from the Parliamentary Agents of the Corporation, in which they expressed approval of the form of petition against the Bill read at the last meeting, and rejected. The Town Clerk said he read the letter in justification of the course he took in preparing the petition, and as a reply to some observations made at the meeting on the 29th ult.

Alderman March moved the adoption of a petition against the Bill, which petition he said was slightly altered from that which was presented to, and rejected by, the Council at the meeting held the previous week, those alterations meeting with the unanimous approval of the Committee. He hoped there would be no discussion, but that the Council would now unanimously agree to it. The petition was to be presented in order that the Council and the city might appear in their proper position. Alderman Leeman, M.P., who had given a very great deal of attention to the matter, came expressly from London, and spent several hours on Saturday along with the General Committee appointed by the Council, and with the Sub-Committee, in deliberating as to the means which should be taken by the Council in opposing the Gas Company's Bill. He might further state that the gentlemen who represented the Gas Company, who met the Committee on Saturday, did so with the very best feeling, and in a very fair manner; in fact, he might say they met the Committee in a liberal manner. He therefore hoped that their fellow-citizens would not have any occasion to find fault—when the deliberations on that question were concluded—with anything the Council had done. He urged the Members to abstain from any discussion, because there were one or two points which had not been arranged, and the Committee were therefore not quite ready to report to the Council, neither were they aware whether the Directors of the Gas Company had acceded to the alterations the Committee had thought it desirable to make in the Bill.

Mr. Mann asked what was the difference between the two petitions.

The Town Clerk replied that the eighth paragraph had been struck out, and with that exception and one or two verbal alterations the petition remained the same as the former one. The eighth paragraph was as follows:—"That the said Bill contains no provision for the prospective reduction of the dividend of ten per cent. on the original capital of the Company, and that such provision is, as your petitioners humbly submit, expedient and necessary, and ought to be introduced."

Mr. J. Brown seconded the resolution, and in doing so said that they had heard that the petition had been considerably modified in a very important particular. The Committee and the Sub-Committee had taken great pains in considering the question, as also had a certain portion of the Directors of the Gas Company, whom they had met on Saturday, and he thought that if the alterations were agreed to, beneficial results would accrue both to the Gas Company and the City. He believed, from what occurred then, they had very reasonable grounds for the hope, although the Council were going to present the petition *pro formâ*, that the Directors and the Committee of the Council might make such arrangements that the petition might ultimately be withdrawn. From the reasonable manner in which all the points of difference were discussed on Saturday, and from the way in which the Directors listened to the proposals of the Sub-Committee, all parties seemed to be agreed that it was desirable, in the interests of the city, that the matter should be amicably arranged. He hoped that it would be so, and he, therefore, cordially seconded the resolution.

The petition was then unanimously agreed to.

FATAL ACCIDENT AT THE IPSWICH GAS-WORKS.

We take the following report from the *Suffolk Chronicle*:—

On Monday, Feb. 4, a sad accident occurred at the Ipswich Gas-Works, by which one man lost his life, and another so narrowly escaped death that he still lies in a dangerous state. About half-past nine in the morning Mr. Ebenezer Goddard, the Engineer of the Works, was going his accustomed round of the works, when, on entering a shed where the manufacture of sulphate of ammonia is carried on, he found two men, William Last, a labourer, and Thomas Noble, the foreman of the works, lying on the ground in an insensible condition. Mr. Goddard at once raised an alarm, and with the help of a labourer dragged the two men into the open air, and sent for Mr. Webster Adams, surgeon. Last, however, died in about half an hour. Noble was removed to his home, and was for a considerable time in a very critical condition. The cause of the two men's insensibility appears to have been this: One of the products arising from the making of gas is ammonia, which is obtained from the gas by passing the gas through water, for which ammonia has a great chemical affinity. A large quantity of ammoniacal liquor is thus produced, and by the process in operation in the shed where these men were found, the ammonia is separated from the water by boiling, and the vapour passes into a tank called a saturator, in which dilute sulphuric acid is made to come in contact with the vapour, the acid fixing the ammonia, and producing sulphate. At certain stages in the boiling of the ammoniacal liquor, other vapours besides ammonia are given off, amongst them cyanogen, a very deadly gas; and a flue is provided in connection with the saturator, by which these vapours are carried off, and, passing through a coke fire, are destroyed. Mr. Goddard found on examination that the lid of the saturator, which is moveable, in order that sulphuric acid may be supplied at intervals, had been left open, and the result of this would be that the cyanogen would, instead of going up the flue, escape into the shed, and, being a heavy gas, collect on the floor. The two men appear to have stooped for the purpose of pouring some sulphuric acid into a jug, and thus to have inhaled the gas. Last was, on the morning in question, for the first time engaged on this work; Noble, who was foreman, undertook to instruct him in his duties.

The inquest on the body of Last took place in the afternoon, before the Borough Coroner, H. M. Jackaman, Esq.

The Coroner having briefly opened the inquiry, the jury viewed the body, and also the building in which the deceased was found, being accompanied by Mr. E. Goddard and Mr. D. F. Goddard, Engineer and Sub-Engineer to the Company.

Thomas Last, of Dove Lane, St. Helen's, labourer, said the body was that of his son, William Last, aged 36. Deceased was a labourer in the employ of the Gas Company. He was a married man, with two children. He had been for years in the employ of Mr. Goddard, at the Bramford Tar-Works and at the Gas Company's works. He last saw the deceased on Saturday evening, when he was quite well. He did not see him again till that morning, when he was sent for and found him dead. On Saturday, when he saw him, deceased said, "Father, I have got a better place. Mr. Goddard said I deserve a better place." He said, "Father, I dread going, because I think the men might give me a slap on the head." He thought the man whose place he was going to take might be jealous. He (witness) recommended him, if anybody interfered with him, to go and tell the governor at once. Deceased did not mention the name of the man of whom he was afraid.

Mr. Adams, surgeon, asked whether deceased had been under medical treatment for any affection of the heart, or otherwise.

Witness said deceased was in the hospital for a time, about six weeks ago, when he had an accident at the works. Deceased had never complained of shortness of breath. On Saturday he said he felt bad in his head.

Thomas Last, bricklayer's labourer, said he lived next door to deceased. Deceased told him on Sunday, "Tom, I dread my job to-morrow; I'm afraid they'll smack my head." He (witness) said, "If they smack your head, do you tell Mr. Goddard; and, if Mr. Goddard take no notice, I'll make them pay for it myself." Deceased was about to commence some fresh work, and he was afraid some of the others would not like his having it. He thought there was some one who had not quite done his duty, and that he was going to take his place. He believed the man's name was Allison.

John Clarke, general labourer at the gas-works, said he saw deceased first about six o'clock that (Monday) morning, and again after nine o'clock, apparently quite well. About half-past nine or ten, hearing an alarm, he (witness) ran as quickly as possible into a shed, where he saw deceased and a man named Noble lying on the floor. He caught hold of one man, and brought him into the air, and then pulled the other out. Deceased was breathing heavily when he took him out, and died shortly afterwards. He had seen deceased and Noble working together a short time before. They appeared on good terms with each other. The alarm he heard was given by Mr. Goddard. He could give no evidence how the deceased became insensible.

In answer to Mr. Goddard, witness said it was only a minute or two before that he heard deceased and Noble talking together in the passage leading from the old retort-house to the shed where the bodies were. Deceased was the first taken out, Mr. Goddard helping to carry him out, and he went back again immediately for Noble.

Mr. *Ebenezer Goddard*, Manager and Engineer to the Gas Company, said: I arrived at the works about a quarter or twenty minutes past nine, and made a survey of the lower part of the works. On going into the shed where the sulphate of ammonia is manufactured, I found Thomas Noble and the deceased both lying on their backs on the floor of the shed insensible. I immediately called for help, and the last witness assisted me in getting both out into the open air. Neither was at this time dead. I immediately sent for Mr. Webster Adams, and applied such restoratives as were at hand. The deceased died within half an hour, but the measures taken were successful in restoring Noble to consciousness. Deceased had been employed for some time in the works, though not in this department. This morning he was to take charge of the ammoniacal works under the instruction of Thomas Noble, the foreman. There was very little instruction required, the process simply requiring care. The process in which he was engaged was the conversion of ammoniacal liquor into sulphate of ammonia. The vapour of ammonia is passed into a vessel containing dilute sulphuric acid. Deceased was quite competent to do what was necessary. The saturator is provided with a flue for carrying off the noxious vapours, the vapour being passed through heated coke. On examining the shed, immediately after the removal of the bodies, I found that the top of the saturator had been left off, and, consequently, the vapours which should have gone up the flue were evolved into the shed. My impression is that the men were stooping down pouring sulphuric acid from a carboy into an earthen vessel. The gas evolved from the saturator, being a heavy one, would collect near the floor, and in stooping both the men must have inhaled it. The inhalation would produce instant insensibility. Deceased would not know the nature of the gas; the foreman probably would. The lid of the saturator should have been closed immediately after being opened, and I regard the leaving it open as an act of inadvertency. Deceased was selected for this work by the Sub-Engineer, my son, because he was a steady, respectable man. The man who had formerly done the work—Allison—had been set to work in the purifying-house. The manufacture of sulphate of ammonia has been going on in the works for about 30 years, and no accident has before occurred. The lid, I think, must have been off two minutes. If the men had been upright they would not have inhaled the gas, for I felt no ill effects when I went in immediately after. The place is abundantly ventilated. Deceased was a nervous man, and to this I attribute his fear that Allison would be aggrieved.

By a Juror: Noble has been general foreman three or four months. He had to superintend other parts of the works, seeing that everybody was at work, and give any instructions to the men which might be required. Noble has been in the works for many years, serving his apprenticeship as a gas-fitter there, and is a very respectable young man.

A Juror: Do you consider the lid of the saturator is of the best possible construction to prevent the escape of the fumes?

Witness: It has answered the purpose remarkably well during the past. The practice is to lift it and put the acid in and close it at once.

In reply to another Juror, witness said a spring or hinges could not be used, as the sulphuric acid would eat up any metal. There were no special instructions to avoid stooping in the shed.

In reply to Mr. Hawkes, witness said, in picking the two men up he risked inhaling the gas himself.

Mr. *Daniel Ford Goddard*, Sub-Engineer, said he had known deceased for eight years. For about three months deceased had been in the employ of the Company. Previous to that he had been in his private employ at the tar-works at Bramford. About a week ago he asked him whether he wished for another job which would be permanent. He was previously an odd labourer. He said he should like it, and he (witness) explained to him what work it was. He told him he was not satisfied with the way in which the work had been done in the past; that he would be expected to be at work at four o'clock in the morning with a view to lighting the fire at five, when the retorts were drawn; and that his regular wages would be 18s. per week, but if he did the work well there would be some additional bonus. Deceased seemed pleased with the idea, and said he hoped he should give satisfaction. He saw Noble on Saturday. There had been a good deal of trouble about this work, and Noble had suggested Last to do the work. He (witness) said the difficulty was that, beginning work at four o'clock in the morning, the man would have no one with him to show him the different taps, and Noble said if he liked to give him orders he would be there and see that Last got on all right. He told him to do so. He explained to Noble full particulars of the work. He called Noble's attention to the dangerous character of the work, and requested him particularly to have a fire lighted in the flue to carry off the dangerous gases. No written instructions were given. He considered deceased perfectly capable to perform the work. His reason for selecting deceased was his long experience with him in similar work at Bramford. He had no doubt his father had given the correct explanation of the death. There was only one half hour during the process when any dangerous vapours were given off, and this was the time. Allison could have had nothing to do with the deceased's death; he did not think he had been on the works that morning. Noble thoroughly understood the nature of the work from beginning to end. For the purposes of the manufacture it was usual to

put in the sulphuric acid in small quantities. This was always done with a jug, the practice being to close the lid again at once. His (witness's) theory was that, having emptied the contents of the jug, he went to replenish it, leaving the lid open in the meantime. The mere opening of the lid while a jug of acid was poured in would not have allowed sufficient gas to escape.

In answer to questions from the JURY, witness said the only time when dangerous gases were given off was when the liquor was on the boil. After the first half hour this gas was all driven off, and the lid might be left off altogether without danger. The gas was not given off on each addition of the sulphuric acid. The escape of fumes of ammonia told one when it was necessary to supply the acid. The construction of the tank and lid was in accordance with the plan recommended by Mr. Laurie, of Yarmouth, who had had as much experience in these matters as almost any one. It was difficult to use any other kind of lid, as it was necessary sometimes to put the acid in one place and sometimes in another.

Mr. *Webster Adams* said he attended at the works about half-past nine. He saw the bodies of deceased and Noble. Deceased was quite dead. Deceased died, he believed, from asphyxia, caused by the poisonous gas cyanogen being introduced into the air cells of the lungs. Death probably was not instantaneous. Noble was in a critical state; he was partly conscious when he last saw him. Noble was a stronger man than deceased, but in all probability if Mr. Goddard had not gone in at the moment he would have been dead too. There was plenty of ventilation from the top, bottom, and sides of the shed.

Mr. GODDARD asked witness whether the means adopted to carry off the gases were in his opinion sufficient.

Witness said he thought that with care the means were sufficient, considering the size of the tank, which was a small one.

The CORONER put it to the Jury, whether they were satisfied with the evidence before them, or whether they would desire to examine Noble, in which case they must, of course, adjourn. The question for them would be whether the deceased was properly instructed in the nature of the duties required of him, and, if not, whether blame would attach to anybody or not; and it was for them to say whether or not they could do so without examining Noble. The Gas Company, Mr. Goddard assured him, were anxious that every possible inquiry should be made.

The FOREMAN said he thought there should be some means adopted to warn workmen of the danger of leaving the lid of this tank open. He suggested a rule that the lid be kept shut, on pain of a fine, if necessary.

Mr. E. GODDARD said every precaution possible should be taken, and what had occurred would no doubt make any one else more careful. The work was of a simple character, and this was not reckoned a dangerous manufacture.

The CORONER said the fact that no death had occurred for 30 years was evidence that, when properly carried out, it was not dangerous.

Several jurors raised the question whether Noble was capable of instructing the deceased, and whether he did give instructions; and, after a lengthened conversation, the Jury agreed, with the approval of the Coroner, that the inquiry should be adjourned for a week, that Noble might be examined.

We are glad to learn that Noble is now recovering.

HISLOP'S IMPROVED PROCESS OF REGENERATING THE LIME USED IN THE PURIFICATION OF COAL GAS.

As already briefly mentioned in the JOURNAL OF GAS LIGHTING, this subject was recently brought before a meeting of the Chemical Section of the Philosophical Society of Glasgow, by Mr. John Mayer, F.C.S., the Secretary of the Section. We now proceed to place a summary of the paper, and the discussion to which it gave rise, before the notice of our readers.

After explaining that, in arranging for the business of the meeting, he saw that, almost at the last moment, there was to be a blank, which he resolved to do his best to fill up, Mr. Mayer went on to say that his only apology for bringing before the section such an important technical as was indicated in the title of his paper—one connected with a leading branch of chemical industry with which he had no practical acquaintance—was the fact that he had for many years taken a great deal of interest in the chemistry of gas purification, and the secondary or waste products of the gas manufacture, and that during the last few months the process about to be spoken of had impressed itself on his mind as one which was a great step in advance, inasmuch as its use bade fair to be attended with a large amount of economy, and to diminish very considerably the nuisance which seemed invariably to result when "fouled" gas lime was permitted to remain about a gas-works, and more especially when it was being removed as a so-called "waste product." Almost from the very birth of the gas-making industry, the basic alkaline earth, lime, had been used in the purification of gas. For a considerable period, down even to within the recollection of some of those then present, the purifying material was used in the form of a thick milk of lime, in cast-iron tanks; but though the operation was very successful, from a chemical point of view, it was attended with mechanical difficulties that were of so serious a character—in addition to the difficulty of so disposing of the very fœtid waste lime liquor as not to create a nuisance—that it was eventually superseded by the use of dry lime purifiers, the slaked lime being laid on trays or grids in covered chambers or tanks, and allowed to remain exposed to the contact of the gas in its passage from the retorts, where it was generated, to the gasholder, where it was stored. Until within the last eighteen or twenty years, caustic or hydrated lime reigned almost supreme as the purifying agent; but when it was experimentally demonstrated that hydrated peroxide of iron might be used with great effect in removing the impurities from coal gas, it began to establish its claims and its popularity over lime in many of the large gas-works throughout the kingdom, and especially in those of the Metropolis. One of its chief advantages was that it did not, by exposure in the open air, become a nuisance in the same degree as spent lime did; and another was that it could be used over and over again. But it was found that, by itself, it was not sufficient for the removal of all the impurities, and some gas managers got into the practice of using it in admixture with slaked lime and sawdust, while others considered it preferable to use the lime and oxide of iron in separate purifiers, which was the plan now generally had recourse to where the last-named compound was employed as a purifying agent. In small gas-works, however, it might be said that lime was almost exclusively used in the purification of the gas, which was also the case in many works of pretty considerable size; such a process, therefore, as that to be briefly noticed in the paper might well aim at becoming very general, if it could only be satisfactorily shown that it was a success—chemically, mechanically, and commercially.

Before enlarging upon the process, the author thought it might be well to notice very briefly what were the impurities which it was desired to remove from the gas. There were some impurities which were simply diluents, and had no noxious character, amongst which might be mentioned hydrogen, carbonic oxide, and nitrogen. No attempt was made in ordinary practice to remove these bodies. Then there was ammonia, which, to some extent, might also be regarded as a diluent, though its presence in the gas at the burner might be said to be detrimental, while its non-removal from the ordinary illuminants of the gas was certainly indefensible, from a pecuniary point of view, inasmuch as it had now become one of the most important and valuable of the secondary products of the gas manufacture. It was removed from the gas in that part of the apparatus called the scrubber, and its removal was based on the fact of its solubility in water, no lime or other purifying material being required for its abstraction from the illuminating gas. Carbonic acid gas was one of the most important impurities in the gas after it left the scrubber, and yet it should not be forgotten that a quantity of it was separated in that part of the apparatus, chiefly, if not exclusively, as carbonate of ammonia. The author proceeded to say that the only other bodies of which it was necessary to speak as impurities in the gas were the two sulphur compounds—sulphuretted hydrogen and bisulphide of carbon—both of which were very noxious ingredients of themselves, and gave rise to the production of sulphurous and sulphuric acids if they were consumed at the gas-burner along with the illuminating constituents of the gas. The presence of sulphur in the gas supplied to the consumers had of late years become one of the "burning questions" of the day, especially in the Metropolis, during the last few years, under the inspectorial reign of the Gas Referees. Now, slaked lime had a sufficient amount of chemical power to enable it to abstract all the three compounds which had been referred to—namely, carbonic acid, sulphuretted hydrogen, and bisulphide of carbon, and it could be made to remove them so completely as not to leave any material trace of offensive odour in the gas. Latterly, however, it had been found in practice, in the larger gas-works, that the better plan was to remove the sulphuretted hydrogen by means of the oxide of iron, and to separate the carbonic acid in the dry lime purifiers. The removal of the sulphide of carbon was one of the subjects to which a very large amount of attention had been given in recent years by Gas Managers, by the Metropolitan Gas Referees, and by those Chemists who had devoted themselves professionally to gas matters. It was that substance whose presence in London gas really formed the bone of contention between the Gas Companies on the one hand, and the Gas Referees and the Metropolitan Board of Works, as representing the public, on the other. There was no doubt, the author said, that it could be removed until the sulphur should be very much less than 35 or 40 grains per 100 cubic feet of gas, which was not unfrequently the quantity found present on analysis; but the question came to be—"Was the game worth the candle?" The Gas Referees, as the scientific advisers of the Government, replied that it was, in which case the only solution of the difficulty was for the consumers to pay the additional price involved in making the purification more complete, so far as that compound was concerned; for in practice all the sulphuretted hydrogen was removed.

Considering the fact that lime was so universally and so extensively used in the purification of illuminating gas, it might be well to devote a little attention to the consideration of the spent or fouled lime. In some large towns it was practically a valueless material, on account of the expense involved in carrying it away after it had been once used, or, in other words, after it had been "fouled;" but, in many country places, it had some value as a manurial agent. Some time ago a correspondent of the JOURNAL OF GAS LIGHTING stated that he had several hundred tons of gas lime on hand, for which he could find no market, and he desired to know if there was any other way of utilizing it than for agricultural purposes. He got very little satisfaction in the shape of useful information. Still he was informed that, by certain treatment, plaster of Paris might be made from it, and that it could be used as a cement. It might be used to advantage, under certain circumstances, as a fertilizer, and in that light it was carefully studied some years ago by Professor Voelcker, the well-known agricultural chemist. That gentleman examined its composition, and found that in fresh-spent lime, there was usually from 30 to 40 per cent. of water, while in old samples there was a much less quantity. Probably those old samples had been kept under cover, and not exposed to rain. In the solid matter of the sample specially referred to, almost one-half was carbonate of lime, in addition to which there was caustic lime to the extent of fully 18 per cent., thus showing that the purifying power of the lime was far from being exhausted. Rather more than 15 per cent. of the whole was sulphite of lime, a compound which might be regarded as the first stage in the oxidation of the sulphur abstracted from the gas. Sulphate of lime, or gypsum, which was a result of further oxidation, was present to the extent of fully 4½ per cent. Mr. Mayer quoted other analyses of spent lime, which he referred to at some length, and said that the product in question was of a very variable composition, owing partly to its freshness, partly to the length of time during which it had been exposed to the action of the gas in the purifiers, and to other causes. There was no doubt, he remarked, that by allowing the spent lime to weather in the open air, it would, in course of time, consist largely of sulphate of lime, in consequence of the slow oxidation of the sulphide and other easily transformed calcium compounds. After referring to the very suggestive remarks of Mr. Lewis T. Wright, on the chemical action which takes place in a dry lime purifier, the author proceeded to say that, as to the very complex composition of "fouled" gas lime there could be no doubt whatever; but how to turn the substance to account profitably, and reduce the nuisance connected with it to a minimum, was a question that had occupied the attention of many gas managers, and chemists. Certainly the most successful worker in that field of practical investigation up to the present time, so far as he was aware, was Mr George R. Hislop, F.C.S., the well-known Manager of the Paisley Corporation Gas-Works. That gentleman had attacked the problem of regenerating or revivifying spent gas lime some years ago. He took some large blocks, and calcined them with coke in the usual way, and the results were upon the whole very successful. The great difficulty, however, was how to recalcine the smaller portions of the lime, and, in order to get over that difficulty, he had a quantity of gas lime passed through a pan-mill, in which the lime was broken down, in order to give it a suitable consistency, and fitted for being easily moulded into bricks, which were introduced into a kiln in the usual way. So far the process satisfied him. The bricks were well formed, and in a way that they could be handled and placed in the kiln. But he was not entirely satisfied with the process, as it was impossible, under ordinary circumstances to make sure that the lime in the centre of the bricks was completely recalcined or revivified, and he eventually came to the conclusion that the spent lime must be recalcined in as fine a state of division as possible. His experiments gradually led him to devise a furnace or kiln of special construction for the purpose, and with it he had now been working on a practical scale for many months. Indeed, he had informed the author that the lime which he was using in the purification process at his works was that which he obtained by calcining raw limestone in the ordinary way about a year ago, and that he had now entirely discarded raw limestone, whereas he formerly used from 800 to 1000 tons of that material per annum.

The author said that he had seen the lime-regenerating process in operation several times at the Paisley Gas-Works; he had also seen it in operation at the Greenock Corporation Gas-Works; and in the hands both of Mr. Hislop and Mr. Samuel Stewart it seemed to work exceedingly well, and to be, indeed, a very marked success. Proceeding to describe the process, he said the kiln consist of a series of four calcining chambers arranged vertically over each other, and, together with the furnace underneath them, occupying the space of one of the ovens

of the retort-bench. They are about 9 feet long and 2 feet 6 inches wide. The uppermost, which is the drying chamber, has a capacity fully equal to the united capacity of the other three, which are the calcining chambers proper, and are each about 9½ inches high. All the chambers are constructed of fire-clay tiles and blocks of similar form. The gases from the furnace pass to the further end of the same, where, by means of two ports at the corners, they pass into the lowermost calcining chamber over the top of, and in close contact with, the spent lime, to the fore end of the same; thence up through two ports as before, traversing the second chamber in the same way; then the third chamber; and, lastly, the topmost or drying chamber, from which they enter the main flue, the entrance to which is regulated by a suitable damper. The spent lime is first charged into the drying chamber by means of a shovel (from the floor at the Paisley Gas-Works, and from a waggon at the Greenock Gas-Works), and it remains in that chamber during the regeneration of the contents of the chambers underneath; and after the latter have been discharged into an iron waggon or barrow, the contents of the upper chamber are discharged into the lower chambers through a port near to the front of each, the opening of which is covered with a suitable tile, as the chambers are successively filled, commencing at the lowermost, and the gases from the furnace, while passing over, and in close contact with, the spent lime, disengage the carbonic acid and other impurities. Air is admitted through ventilating flue-boxes, placed on either side of the furnace near to the ground, whence it is conveyed to, and directed against, the fuel in the furnace near to the centre of the furnace bars, where it issues from a number of holes, about 1½ inch in diameter, pierced through fire-clay blocks, which form part of the sides of the furnace. These air-holes pass through the blocks with a dip of about 1½ inch towards the furnace-bars. In practice it is found that one man can attend to two sets of chambers such as those just described, and regenerate upwards of 50 cwt. of spent lime per shift of 12 hours, with a consumption of about 8 cwt. of fuel, which is usually the coke of ordinary cannel coal.

Mr. Mayer remarked that so far as the drying and recalcining of the spent lime were concerned, the operations which he had seen at Paisley and Greenock were practically the same; but he had learned from Mr. Hislop that he was making arrangements for carrying out another part of his process, and which, indeed, he had seen in progress. When oxide of iron, he said, was employed along with lime in the purification of the gas, the last-named compound was produced chiefly in the state of carbonate, and was therefore ready for recalcination immediately that the purifier containing it was thrown out of use; and, according to Mr. Hislop, it might be fouled and revivified for an indefinite number of times, say a hundred, more or less. But when no oxide of iron was employed, the lime produced was largely charged with sulphur, as well as carbonic acid and other impurities; and while that lime might be restored from 15 to 20 times, or more, before becoming exhausted by its combination with sulphur, forming sulphate of lime, that gentleman had provided in his process that, in order to render the lime more durable, and "go on for ever," as the Editor of the JOURNAL OF GAS LIGHTING had put it, the waste gases from the retort furnaces, boiler furnaces, or the calcining chambers themselves, consisting chiefly of carbonic acid, should be drawn off by an exhauster or pump, and forced up through the spent lime, after being shut off from the gas as fouled in the purifier. His intention was to connect the chimney, or main flue, with the purifiers by means of cast-iron pipes, laid in a cold water condenser. By that arrangement the carbonic acid from the sources referred to would, on being passed through the sulphuretted lime in the purifier, displace the sulphur chiefly in the form of sulphuretted hydrogen, and combine with the lime to form lime carbonate. The discharged gases from the fouled purifier would then be passed through oxide of iron in an adjoining purifier, the residual gaseous matter being allowed to pass into the open air or into a chimney, and the oxide of iron, after absorbing all the sulphurous impurities, as in gas purification, being removed and exposed to the air for revivification in the usual manner, and the carbonated lime transferred to the calcining chambers, and restored to the condition of quicklime as before.

In concluding, the author regretted that, owing to the short time at his disposal for preparing the paper, there had been no opportunity for getting analyses made of gas lime which had been a number of times fouled and recalcined, so as to see if there was any material and gradual increase in the amount of sulphate of lime. On that point, however, he had been informed that there seemed to be no diminution in the purifying power of recalcined gas lime. In other respects the paper had been incomplete; but he was glad to see Mr. Hislop and Mr. Stewart present, both of whom would doubtless be willing to supplement his remarks from their own practical experience of the process.

A discussion then took place.

MR. J. J. COLEMAN, F.C.S., said that it would be essential to the financia success of the process that all sulphur compounds should be removed from the gas prior to the latter being brought into contact with the lime, otherwise there would, he thought, be a progressive deterioration of the lime each time it was recalcined. He considered that this would practically be very difficult to manage. If the lime were deteriorated only to the extent of 10 per cent. at each reburning, by accumulation of sulphates or sulphides—a not unreasonable possibility—then by the end of the fifth recalcination the cost of reburning would exceed that of fresh lime. The removal of sulphur from coal gas by ferric oxide, and its recovery from the oxide by conversion into sulphurous acid in the vitriol chamber furnace, or its recovery in the free state by the process of Pelouze (now in operation in London)—namely, by solution in hot coal tar naphtha and subsequent crystallization, were operations of great interest, and likely to have an important influence in rendering us independent of foreign sources of supply.

MR. SAMUEL STEWART, Greenock, remarked that he had been using the process, and burning the spent lime for about two months, during which time he had reburnt about 100 tons of the lime, or, in other words, about double that quantity of spent lime, for the latter lost nearly half its weight in the process of revivifying. He had found no difficulty or mystery in recalcining the spent lime. The recalcining chambers at the Greenock Gas-Works occupied the place of an ordinary oven of retorts in the retort-bench, and they were worked at six-hour charges, producing something like 45 cwt. of reburnt lime per 24 hours. The lime was found to stand in the purifiers equally well with, and also about the same time as, the "shell" lime, even after being recalcined several times. He said, however, that he only used lime to remove the carbonic acid from the gas, the sulphuretted hydrogen being removed by means of bog iron ore. The spent lime, therefore, contained very little sulphur. Speaking of the "life" of the chamber, he said that he estimated that it would be equal to the production of from 800 to 1000 tons of reburnt lime; and he calculated the expense of renewing the chamber at from £40 to £50, or about 1s. per ton of reburnt lime. Owing to the distance of his purifiers from the retort-house, he had an additional item of expense over Mr. Hislop for wheeling the lime. That made the cost of reburning the lime so much dearer at the Greenock Gas-Works. Still, he found that the cost of labour and fuel did not exceed 9s. per ton, or, adding 1s. for renewal, say 10s. per ton, or about one-half the cost of new "shell" lime. Not having had an opportunity of getting either the spent or reburnt lime analyzed, he was unable to say if all the impurities were driven off by the reburning.

MR. JAMES R. NAPIER, F.R.S., asked if the process could be employed profitably in small gas-works.

Mr. MAYER replied that as yet there was no experience on that point, but he understood that the patentee was of opinion that it could be so worked, even in very small works.

Mr. JAMES HISLOP, Maryhill, had no doubt that there were certain limits in regard to the application of the process in question, as there were in regard to many other processes. It would certainly not be profitable in very small gas-works where fuel had to be purchased even for the heating of the gas-retorts; but, to put the matter in a general way, it might be stated that in works producing annually 3 million feet of gas and upwards, the regeneration of foul lime might be profitably carried on.

Mr. D. M. NELSON was of opinion that the process could not be economically conducted on a very small scale.

Dr. WALLACE, Gas Examiner, Glasgow, remarked that if any sulphur compounds remained in the spent lime, the burnt lime would contain sulphate. He had found that when limestone containing pyrites was calcined, the product retained fully half of the sulphur in the form of sulphate. The value of the process would, therefore, depend very much upon the extent to which the sulphur compounds were got rid of before calcination. Again, the utility of the invention would depend upon local circumstances. In London, for example, the process would be invaluable; and in places where the spent lime could not be disposed of advantageously it would undoubtedly be profitable. But in such towns as Glasgow, where the waste lime was readily sold, it became simply a question of cost whether it would be better to revivify the spent lime or use fresh material every time. The price got for spent lime in Glasgow was from 1s. 6d. to 2s. 6d., per ton, which was equal to from 3s. to 5s. of the cost of the original lime, and that amount added to 9s. as the probable cost of revivifying, came pretty close upon the value of burnt Irish lime—that was to say, about 16s., all charges included.

Mr. W. KEY, Tradeston Gas-Works, Glasgow, also made some remarks upon the relative cost of fresh lime and recalcined lime, so far as Glasgow was concerned. At his works the "shell" lime was obtained very economically from Irish limestone, and the farmers readily purchased the spent lime.

Mr. STEWART remarked that Irish lime "shells" laid down at his works cost from 19s. to 20s. per ton, or about twice of the expense of recalcining spent gas lime.

Mr. G. R. HISLOP, Paisley, at the request of the President, next addressed the meeting. He said that, not being a member of the Society, he had attended, on the invitation of Mr. Mayer, simply as a listener to what might be said on the subject discussed in the paper. He expected that had Mr. Mayer's paper come on a week or two later, he would have been in a better position to state important facts in connection with the subject, and to have been able to submit analyses of the lime at the different stages of the process, and after several reburnings; but he was only then engaged in perfecting the desulphuretting part of the process. Undoubtedly, it was of great importance to have the last vestige of the sulphur discharged from the fouled lime before recalcining it, and this he proposed to do by means of the carbonic acid produced in the gas-retort furnaces, sufficiently cooled and passed up through the lime in the purifiers, so soon as they were turned off as fouled. In that way the carbonic acid gas, passing through the myriads of channels formed in the lime, would very speedily discharge the sulphuretted hydrogen, which in its turn would be passed into the oxide of iron. The simple acetate of lead test would indicate when the whole of the sulphuretted hydrogen had been expelled. By that part of the process the valuable sulphur, which had been largely, and in most cases, thrown away as waste, would be recovered. It was by no means a small quantity of sulphur that was allowed to go to waste; for, after allowing for what might be removed by the scrubbers and washers, it would amount to from 10 lbs. to 13 lbs. per ton of coal carbonized. That was a point not to be lost sight of. Mr. Stewart, who, like himself, purified his gas partly by oxide of iron, intended, in the meantime, to burn his lime with what little sulphur it might contain; and, with regard to the number of times it might be recalcined, he (Mr. Hislop) might state that, of the 60 or 70 tons of lime which he had had in use at the Paisley Gas-Works for the past twelve months, a portion which had been fouled 45 times (and, in several instances, made specially foul for the purpose of experiment), contained only 22½ per cent. of sulphate of lime. Then, as to the value of the spent lime, as ordinarily produced—like Mr. Stewart, he had always had considerable difficulty in getting it disposed of. Not unfrequently, at least in mid-winter, he had sold it at from 4d. to 10d. per ton. But, even supposing that 1s. 6d. per ton could be got for the spent lime, as Dr. Wallace had stated, and that it required nearly two tons of spent lime to produce one ton of quicklime, Mr. Hislop found that well nigh, if not even fully, this sum would be saved in the preparation alone of the reburned lime, which required no riddling or screening, inasmuch as it contained no stones, and altogether it was much more speedily prepared for use. Speaking of the cost of producing quicklime direct from the raw stone, he said that, before resorting to the regular use of his revivifying process, he had produced all the lime required at the Paisley Gas-Works from Irish limestone, and he quite agreed with Dr. Wallace on the question of first cost. The material could not be produced for less than the amount mentioned—namely, 16s. per ton.

The PRESIDENT (Professor Ferguson, M.A.) then summed up the discussion in a few remarks, and, in proposing the thanks of the Section to Mr. Mayer for his interesting paper, he expressed a hope that another paper on the subject would be brought forward at a future meeting, in which the desired analytical results would be embodied.

REDUCTION IN THE WASTE OF WATER AT LIVERPOOL.—At the meeting of the Liverpool Water Committee, on Monday, the 4th inst., Mr. Deacon, the Engineer, reported that the 20 reducing valves, which the Committee, on Nov. 24, 1876, instructed him to make and fix, had now been in operation for about nine months, and he was therefore in a position to lay before the Committee a statement of the result of the application of the valves. The consumption of water in the 20 reducing-valve districts had been ascertained from the meter diagrams for a period of six months before and six months after the valves were fixed. The consumption in the districts during one week immediately before the valves were fixed, and that during one week at the present time, had also been calculated. In both cases the reduction shown in the consumption, consequent upon the introduction of the valves, was three gallons per head per day. Applied to the population of the districts, this amounted to 211,200 gallons per day, and to 77,088,000 gallons per annum. At the present cost price of the water distributed by the Corporation, its value was about £2250 per annum. The cost of constructing the valves ordered by the Committee had been less than £6 each. He estimated the average cost of constructing these valves in future, including covers and any syphon chambers which might be necessary, and of fixing, at £8 10s. each. Allowing for all contingencies, the cost would not exceed £10 each. He recommended that 25 more valves should be constructed. The report was adopted.

WATER GAS IN AMERICA.

By Mr. ROBERT BRIGGS, C.E., Philadelphia.

The publication in the *American Gaslight Journal*,* of analyses of gas made by the Lowe process, at Harrisburgh, Pa., by Professor Henry Morton, of the Stevens Institute, brings up anew some old questions as to the chemistry and physics of water gas, and as to its suitability for general public and private use as illuminating gas.

Professor Morton's analyses may be accepted fully as exhibiting the most favourable production of this gas as a process. From these analyses it is made evident that through the action of heat a certain volume of steam has been separated into its original elements of hydrogen and oxygen, or at least the hydrogen component has been set free, and the oxygen taken up by, or absorbed chemically into, such proportion of carbon (which was present as incandescent anthracite coal) as will form carbonic oxide. The hydrogen and carbonic oxide are shown by the analyses to be, say, 30 per cent. each, or together 60 per cent. of the gas at Harrisburgh, while the remaining 40 per cent. is composed of marsh gas and petroleum vapours, which 40 per cent., may be taken as having its derivation from the benzine or petroleum, the use and distillation of a certain quantity of which is a part of the Lowe process; the Harrisburgh gas, like most of the recent water gases, deriving its illuminating qualities from this source in place of the canal coal, rosin, oil or other substances which were used in the older processes. The analyses do not exhibit the exact proportions stated above, but the most of the variations between them and this statement are due to imperfections of production inseparable from all processes which may give rise to carbonic acid gas, and which do not in any way eliminate the original impurities of the fuel or the petroleum. A theoretically perfect water gas for illuminating purposes can be accepted to have very nearly the constituents stated above.

Let a consideration be had as to what occurs in the dissociation of water, the elimination of the hydrogen, and the formation of the carbonic oxide of this assumed volume of 60 per cent. of the gas. One pound of hydrogen is found in 9 lbs. of water (or of steam, which is water vaporized by heat); and 1 lb. of hydrogen in burning with 8 lbs of oxygen will give out 62,000 units of heat, forming in this manner the 9 lbs. of water. [A unit of heat (English) being the heat of elevating the temperature of 1 lb. of water one degree.] The dissociation of water to again form hydrogen and oxygen will necessarily have a cooling effect—that is, heat must be supplied from other sources, equal to 62,000 heat units. In this Lowe process a certain portion of the heat is supplied at once in the vaporization of the water into steam. Suppose the condition of the steam, when it reaches the incandescent fuel, or material which is to decompose it, to be equivalent to dry steam at 212°, then 966 units of heat will have been expended on each pound in vaporization from 212°. [In the data which gives 62,000 heat units as coming from the combustion of 1 lb. of hydrogen, the assumption made was that the hydrogen was burned from some usual temperature, say 70°, and the products reduced to that temperature, when the latent heat of evaporation became 1065° in place of 966°; but as, in this case, the products of combustion are of much higher temperature than 70°, the 99° which would follow from perfect utilization of the heat may be considered as expended in imparting heat to them. This supposition does not imply merely the addition of 99° to the temperature of the resulting gases; here the low specific heat of these gases causes the 99° in units of weight of water to be equivalent to 216° in units of weight of gas, while as there are 15 lbs. of gases to 9 lbs. of water, the temperature of the 15 lbs. becomes 130°, which, added to the 212°, gives 342° as the temperature of the escaping gases. It may be well to remark here that the numerous attempts to gain an increment of heat by superheated steam when making water gas have been failures from the physical conditions. The quantity of heat wanted is enormous, when the small amount of steam, which is the supposed vehicle, is considered. Suppose the steam to be under constant pressure, and suppose that its specific heat remained the same at high temperatures, theory demands that the steam should be heated to 12,330° and at once fall to 70° when dissociation occurs. There is scarcely any practical application to be made of superheated steam.] Following the supposition that the heat of evaporation at 212°, or 966 units, is supplied as a preliminary to the gas-making process, the 9 lbs. of water will have furnished (9 × 966 =) 8700 units of heat, leaving 53,300 units as requisite to complete the elimination of 1 lb. of hydrogen.

The process from this point is as follows:—9 lbs. of water with 6 lbs. of carbon will, from the action of heat, yield 1 lb. of free hydrogen together with 14 lbs. of carbonic oxide, made by the combination of 8 lbs. of oxygen with 6 lbs. of carbon. The combination of each pound of carbon with the oxygen will evolve 4400 units of heat; whence (6 × 440 =) 26,400 units will be eliminated from this source. This leaves (53,300–26,400 =) 26,900 units of heat to be supplied by contact of the gases with heated coal, or other heated bodies such as fire-bricks or retort surfaces, the temperature of which must be above that of dissociation, even after parting with large quantities of heat. The heat to be supplied to these incandescent materials must evidently be derived by the burning of fuel other than that which furnished the carbon for the carbonic oxide. The resulting volume of these 15 lbs. of gas is 377 cubic feet at 70°, the specific gravity of the mixture of hydrogen and carbonic oxide is 0·52 (as compared with air unity), and there is 25·73 cubic feet of the gas to the pound.

The claim of the "Lowe process" is that 50 lbs. of anthracite and 3 gallons of petroleum (benzine) will make 1000 cubic feet of illuminating gas of somewhat above standard quality on an average production. It is understood that about 4000 cubic feet is the result of each effort, or "run" of the process. Reducing Professor Morton's figures, there appears to be requisite for the production of 4000 feet of the gas—

64·9 lbs. of water in the form of steam.
38·4 lbs. of carbon in the form of anthracite coal devoid of ash.
80·0 lbs. of hydrocarbon in the form of petroleum† products of destructive distillation of benzine or petroleum.
2·7 lbs. of atmospheric air.

186·0 lbs. of gas of 0·62 density = 0·0465 lbs. per cubic foot at 70° = 4000 cubic feet in all. [In fact this gas must have had 1 to 1½ per cent. in volume of aqueous vapour, but it may be supposed that Professor Morton neglected this in his analyses, and refers to dry gas.]

The formation of this 4000 cubic feet of gas, so far as the chemical changes accompanying the formation of water gas is concerned, involves the expenditure of about 163,000 units of heat. The heat demanded for the distillation of the petroleum is altogether uncertain. Some theories suppose that little or no heat is expended in such a distillation, only that the attaining of some given temperature for an instant of time releases the atoms of the hydrocarbons, so that they form new elective combinations, any of which will produce heat when burned in combination with oxygen proportionate to the quantities of carbon and hydrogen in each of them. But it is clear that a high heat must be attained and preserved in the vessels of decomposition—retorts, generators, or what not—and that these vessels are exposed to great losses of heat to the surrounding air. If 500,000 units of heat were taken, as a guess, for the requirement of heating a "run" of the Lowe gas, and the average yield of heat from anthracite coal of fair quality of 10,000 heat units to the pound be accepted, then 50 lbs. of coal per run would be required for this purpose. The 38·4 lbs. of carbon which form the material of gas-making may be held to result from 45 lbs. of anthracite coal as above, so that 95 lbs. of anthracite become the estimated quantity for a run of the process. The 80 lbs. of hydrocarbon could proceed as a least quantity from 11 gallons of petroleum of 0·87 density. It is claimed for the Lowe process 200 lbs. of anthracite and 12 gallons of petroleum will yield 4000 cubic feet of gas; the theoretic quantities based on Professor Morton's analyses may be considered as 95 lbs. of anthracite and 11 gallons of petroleum. The loss from the estimated best result is 105 lbs. of anthracite and 1 gallon of petroleum each run.

Taking any of the water gas processes, including and since that of White in 1852, whether by "generator" or by "retort," as the means of exposing the water to the heat of dissociation, the result of the Lowe process at Harrisburgh compares favourably both in fuel and in product. If such gas as Professor Morton describes can be made as a general thing from the materials claimed by the Lowe people, without inordinate wear upon the apparatus, the success of this new water gas project is but a question of time.

The remainder of Professor Morton's paper, referring to the character of this gas, in regard to its suitability for public use for illuminating gas, is open to grave question as to the facts and deductions, and seems to demand an answer to prevent a popular spread of such views. The issue was made, considered, and determined years ago, not only with "water gas," but with other coal gas of any kind. Undoubtedly, "the presence of even a few per cent. of [any illuminating gas as well as of] this gas in the air of a room renders it utterly unfit for breathing, and often even fatal." But carbonic oxide gas is not "one of the most virulent and dangerous of gas poisons," and no serious difficulty does arise from the presence of carbonic acid gas, whether resulting from the burning of carbonic oxide, or of carbon in other conditions of gaseous combination, in vitiating the air of rooms as usually constructed and occupied, where illumination, in the ordinary sense, proceeds from such burning.

As a gas, carbonic oxide, pure and simple, is but in the least degree more dangerous than ordinary coal gas. The Professor can try for himself on the lower animals, and I am convinced he will find poor "pussy" quite as quickly affected, and quite as difficult to resuscitate, and quite as little poisoned with the second as with the first; and that the per centage of gases present in the air necessary to produce asphyxiation in nearly equal times will not materially vary. From personal inquiry which I made a few years since at a gas-works, where a water gas process continued in use for a long time, I obtained such information as to induce me to believe that no poisoning whatever followed the inhalation of carbonic oxide. It did seem to be more active in causing insensibility—in knocking a man over, as a workman said—but no real disaster, or even serious case of suffocation ever happened. Headaches, of the same intensity of discomfort as those which follow the accidental breathing of coal gas, were the worst resulting effect. Certainly any one who will breathe an atmosphere largely composed of coal gas will be suffocated unless promptly removed from the locality.

It is easy to write that "the presence of a few per cent. of gas in the air of a room renders it utterly unfit for breathing, and often even fatal," but it is well to consider what a few per cent. means. There are many persons who habitually sleep in chambers of no great size (cubic capacity), and which have no especial provision for ventilation, with a gaslight burning all night; while there are few who from some cause may not have done so frequently, or at least at times. An ordinary small bedroom of the smallest size may be taken as having 100 square feet of floor (10 feet × 10 feet or 8 feet × 12 feet) and to be 9 feet in height, having thus 900 feet capacity. In such a sleeping-room, with one or two occupants, a gas-burner is often permitted to remain lighted all night. Suppose the burner to consume ordinary quality and density of coal gas, at the rate of 5 feet per hour, the burning of this gas would evolve in the same time 0·315 pounds of vapour of water, and 0·346 pounds of carbonic acid gas, the volume of the latter substance being 3 cubic feet, at a temperature of 70°.

In the absence of any specific gravity figures for the Harrisburgh gas, the density of the vapours or gases designated as olefines can be taken to agree with that of olefiant gas (= 0·981), when a careful computation of the data, which is otherwise ample for the exactness of this statement, gives a specific gravity of 0·62; that of ordinary coal gas, of 14 to 15 candle power, being 0·43. The same computation which gives the density finds nearly the same quantity of carbon present as in the same weight of ordinary coal gas; but as the volumes of these gases vary inversely with their specific gravities, that is as 0·43 to 0·62, it follows that a cubic foot of Harrisburgh gas contains 44 per cent. more carbon than a cubic foot of ordinary coal gas. Here, again, the data fails; no report of the illuminating value of Harrisburgh gas accompanies the analyses. If this is on an equality in illuminating power with coal gas, then 44 per cent., and not 70 per cent., as given by Professor Morton, more of carbonic acid gas will be evolved in giving equal light in equal time.

But this discussion as to proportionate quantities of carbonic acid gas is an episode in the argument. About 3 cubic feet of carbonic acid gas come from the burning of ordinary coal gas, with a 5-foot burner, each hour. Not the slightest ill effect follows to the occupant of a sleeping or other room from this hourly supply. If it were all retained in the room, from complete absence of ventilation, it would take three hours before the supposed bed-room, of 900 cubic feet capacity, would have one per cent. of carbonic acid from this source alone. The exhalations of breath give out about 0·6 cubic foot of carbonic acid gas in an hour's time, so that in an occupied room of 900 cubic feet capacity, entirely closed from ventilation, one per cent. of carbonic acid might accumulate in less than three hours; while with any reasonable ventilation, suited to render such a chamber habitable, the reaching of one per cent. is a simple impossibility in any length of time of probable gas burning and occupancy whatever. In reality, seven-tenths of 1 per cent. of carbonic acid gas has been found in crowded, long occupied, closed rooms, under conditions of external atmosphere as regards temperature and moisture peculiarly unfavourable to diffusion, or to inducement of natural ventilation, and at no other times. The ultimate product of combustion of carbon is aptly stated by one eminent chemist as "an invisible, innocuous gas," and the same may be said of the product of combustion of hydrogen. Both of these gases are excreted cutaneously from all animals, and the presence of either of them in an atmosphere of habitation to the proportions of a few per cent. will be found decidedly unhealthy, rising to the point of danger by interrupting the natural secretions. Carbonic acid gas must be diffused, while aqueous vapour will not only diffuse, but will condense, so as to reduce the per centage present in air at temperatures far above those of comfort or of nature in the habitable part of the globe.

On the other hand it must be admitted that all illuminating gas is very dangerous when permitted to escape into a room unburned. The same

* Reproduced in this JOURNAL, Vol. xxxi., pp. 21-2.

† In this estimate of petroleum I take the proportion of marsh gas to olefines as that given by Professor Morton, considering the density of the olefines to be equal to that of olefiant gas; an approximate result, of course, follows.

course of reasoning which has been followed with regard to carbonic acid gas can be applied to unburned coal or other illuminating gases, with correction for time, in that the last gases will be supplied to a room as 5 feet to 3 feet of the first. But far less than one per cent. is dangerous. Whilst writing this article, within a single week, the newspapers give four resuscitations of persons in hotels, in different parts of the country, who had had three or four hours exposure to the effects of gas escaping from a burner in the bed-chamber. The chance of any person surviving who goes to sleep with an extinguished open gas-burner in his closed room, and remains unawakened until morning, is not very great. What, however, I wish to show distinctly is that there is little choice as to whether the gas of suffocation, in such case, shall be 30 per cent. of carbonic oxide, or have the same 30 per cent. substituted by marsh gas.

For nearly 30 years the efforts to make a water gas have been repeated and persistent; success had been a remote accomplishment—the place where it has been reached has always been a long way off; and, by a curious fatality just at the time when, at any place, complete success has been reached, the processes have been superseded or suspended. The Lowe process differs from other "generator" processes in the intermittent action, so that the resulting gas is nearly free from nitrogen derived from the air of combustion, which supplies the heat to effect the dissociation of water. As to the final, economical, or practical result of this process I express no opinion; it remains to those who are interested in it to develop it if they can; but it is clearly proper that it should have a fair chance on its merits, and that it should not be condemned upon the hypothesis that it is especially dangerous above ordinary coal gas, or that it is too dangerous to use.

There is, however, one other question of great public interest, in connection with this and other novel gas processes which are being offered to form the bases of rival gas companies in our cities. Is it really good policy for our legislators to grant, or for our capitalists to encourage, or a sound political economy, for our writers to advocate the wholesale destruction of property which is involved in the formation of a new gas company, to occupy the best portion of a city already provided with means for supplying any demand for gas lighting? The greatest saving imaginable in the cost of gas-making is but a small item in the profits of a gas company, when estimated with regard to the income from that portion of the territory covered by the company's distribution, which brings a really remunerative return on the prime investment. Gas, at any cost of practical gas-making, high or low in cost, can be sold at a great reduction from the uniform price, at a profit, to consumers resident within a certain one-sixth or one-eighth of the area of any of our cities.

This train of argument would open a discussion much longer than should be based on a consideration of analyses of Harrisburgh water gas. That man may be a great benefactor to his species "who makes two blades of grass grow where one grew before;" but it may remain a mooted point whether the inventor who has succeeded in getting two capitals, and two supplies for one demand, has really achieved what is conducive to the public good.—*American Gaslight Journal.*

Eckington Water Company.—At the annual meeting, on the 4th inst., the Directors report on the past year's working was read, showing that over 570 houses were now using the Company's water. The amount available for dividend was £395 19s. 1½d., which sum the Directors advised to be used in paying an 8 per cent. dividend, which would leave £70 for the reserve-fund. The recommendation was adopted. The report also showed that the income of the Company had increased to such an extent as to allow of a concession being made in the prices charged for the water. The Chairman stated that there had been several rumours afloat about the Directors wanting to sell the water-works; but he was in a position to say that the rumours were false.

Hull Gas Supply.—Mr. James Baynes, jun., reports that the results of his analyses of the gas supplied to the East district, by the Sutton, Southcoates, and Drypool Gas Company, during January were as follows:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·30 ..	15·42 ..	15·78
Grains of sulphur per 100 cubic feet . .	— ..	— ..	13·58
Grains of ammonia per 100 cubic feet . .	— ..	— ..	8·63

Mean barometer and temperature in experiment-room — Bar., 30·07; temp. 47°.

Bodmin Gas Consumers Company.—The annual meeting was held on the 4th inst.—Mr. S. Hicks in the chair.—The report of the Directors showed an available balance of £469 7s. 3d., out of which they recommend that the usual dividend of 8 per cent. should be declared. Since the last general meeting enlarged mains, from the Gas-Works to the Military Brigade Depôt, had been laid down, and the Barracks had now a full supply of gas. This supply, and the increased demand from ordinary customers, had necessitated extensive alterations and additions to the works and enlarged mains in Fore Street, portions of which had been completed and the cost included in the year's accounts, but a further outlay would be required for the purchase of a larger gasholder and purifiers. The actual and estimated cost of carrying out these works would be about £1400, towards which sum the War Department had contributed £400. The Directors, therefore, in order to be enabled to complete these extensions, recommended that the sum of £1000 should be borrowed on the security of the plant. The report was unanimously received and adopted, and it was resolved that the £1000 should be borrowed at 4 per cent. interest. Two of the Directors, Messrs. J. M. H. Cardell and S. Hender, who retired by rotation, were re-elected, as were also the Auditors, Messrs. Crabb and J. R. Collins. The usual votes of thanks were cordially given to the Chairman, Board of Directors, Auditors, Secretary, and Manager.

Limerick Gas Company.—An extraordinary meeting of this Company was held on the 5th inst., at the City Terminus Hotel, London, for the purpose of considering the provisions of the Bill now before Parliament for transferring the undertaking to the Corporation of Limerick. Mr. Paddon, who presided, said the Bill promoted by the Corporation gave effect to certain agreements already entered into with the Directors for purchasing the property of the Company; but it was necessary, before the measure could proceed, that the Shareholders should formally signify their approval of it. The Directors had given all the clauses of the Bill the most careful consideration, and they saw no reason whatever to object to any of its provisions, or why the proprietors should not give it their approval. He concluded by moving a resolution to that effect. The Parliamentary Agent of the Company then briefly explained the clauses of the Bill more particularly affecting the interests of the proprietary, and mentioned that a new clause had been added at the instance of the Directors, providing that, if the purchase was not completed by the end of the next year, the agreement would become null and void. Mr. Godfrey seconded the resolution. In reply to a question, the Chairman said that the gross sum to be paid for the purchase of the works was £45,000, but that amount would be reduced some £12,000 or £13,000 by certain engagements entered into by the Directors, so that they expected to have for division among the proprietors from £30,000 to £32,000. In his opinion these were very favourable terms. The resolution approving the Bill was then adopted *nem. con.*

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The amount of business doing in the various branches of the iron trade in this town and neighbourhood is still on a minimized scale, and there does not yet appear to be any chance of an early revival, albeit a rather more hopeful feeling has arisen out of the conclusion of the armistice, and the proposed changes in the American tariff. In neither case, however, is the "assurance" so "sure" that measures may be based upon the assumption that they are reliable; hence the long looked-for revival is still a matter of the future. Despite this not very cheerful outlook, however, the current production of the blast furnaces is steadily good, particularly in North Derbyshire, and a good deal of the total output is being delivered, either on contracts or current sales, although at two or three establishments stocks are still on the increase. Good Derbyshire and Yorkshire foundry brands range from £2 5s. to £2 11s. 6d. per ton, whilst forge numbers are 5s. to 10s. lower, according to quality, and the ordinary North Yorkshire pigs are quoted as under:—No. 1 foundry, 43s. 6d.; No. 2 foundry, 42s.; No. 3 foundry, 40s.; No. 4 foundry, 39s.; No. 4 forge, 39s.; mottled, 38s. 6d.; white, 38s.; refined metal, 57s.; Kentledge, 42s. 6d.; and cinder, 55s.; all per ton f.o.r., for net cash. Some of the hematite brands are rather easier in price, one house having lowered 2s. 6d. per ton last week. Merchant irons are neglected, much as heretofore, and in manufactured irons there is very little business doing. The Belgians continue to beat us in the matter of girders and other constructive iron.

Of fuel there is little that is novel to report, save that at Renishaw the question of lower wages has been postponed, whilst at Shireoaks a difficulty has arisen, owing to a new way of filling the corves with hard coal. There is a fair amount of business in household coals, but prices yield no more than a very bare margin of profit to the merchants.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There has been a slight improvement in the demand for the better classes of round coal, in consequence of the colder weather of the past week; but this has had no material effect upon prices, as supplies are still abundant in the market, and the production could be readily increased to meet any extra inquiry that can be expected. In other classes of fuel there is no change, the unsettled and depressed state of trade throughout the district naturally affecting the demand for all descriptions of fuel for manufacturing purposes, and the keen competition which has to be encountered from other districts, especially Yorkshire and Derbyshire, keeps prices very low. For best screened Wigan Arley at the pit mouth prices remain at 10s. to 11s. per ton; and for common ditto, 8s. to 9s. per ton. Pemberton four-feet has now generally receded to the price ruling at the commencement of last month, and the average quotations are 8s. to 8s. 6d. per ton, with 6s. 6d. to 7s. per ton for common Wigan coal, suitable for house-fire purposes. Common coal for steam and forge purposes continues a complete drug, the demand for both home use and shipping purposes being extremely small, and this class of fuel is pushed upon the market by needy holders at such low figures that it is difficult to say at what price it could be bought. The average quotations at the pit mouth range from 5s. 6d. to 6s. 6d. per ton, and for shipping orders as low as 6s. 6d to 7s. per ton has been taken for delivery at the High Level, Liverpool. The better sorts of engine fuel meet with a moderate demand, and prices are generally steady at from 5s. to 5s. 6d. for good burgy, and 3s. to 4s. per ton for good ordinary slack; but the common sorts are difficult to move almost at any price.

In the iron trade there is still very little doing, and not half the plant of the district is at present being employed in the production of either raw or finished iron, whilst in the engineering trades most of the large establishments are running short time. Local makers of pig iron are unable to compete with the extraordinarily low prices at which outside brands are now being offered here; whilst amongst finished iron makers the present very unsatisfactory position of trade has brought about an effort to arrange some uniform basis for prices, so as to prevent the ruinous competition which is at present going on, and it is probable also that the wages question may be again taken into consideration. Local quotations for delivery into the Manchester district remain at 51s. per ton for No. 3 foundry, and 50s. per ton for No. 4 forge pig iron, less 2½ per cent., and £6 5s. to £6 7s. per ton for bars.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

As might have been anticipated from the state of the public mind all over the country, the extremely unsatisfactory and changing nature of the intelligence which was received from the East last week, and which at one time threatened to precipitate England into war, had a most disturbing effect upon the coal trade of the North of England. The news of the armistice, which was made known on Monday, caused a good deal of activity on Newcastle Quayside, and a considerable amount of business was likely to have been transacted for the Black Sea. But when merchants commenced to communicate with their correspondents at Odessa and at Constantinople, they could get no replies to their communications. That put a stop to speculation. The wires seem to have been cut, or something done to them. Then followed the rumours of the march of the Russians into Constantinople, which, of course, was subsequently contradicted, and when the trade got through these rumours and turmoils, the week was far spent. But, as it was known that Odessa was very much in need of coals, some cargoes of gas coals were shipped by steamer and despatched, and it is quite probable that this week a great deal more business will be done in that direction in the way of coal shipments. Very little contracting has yet been entered upon by the Gas Companies in the Baltic. They feel inclined to hold back, in hopes that gas coals may be lower than they now are. The contracts that are being made, however, for other places are at about the figure mentioned last week—namely, 7s. 6d. per ton. Most of the home contracts have been made. The best gas collieries are working full time, but business at the second-class pits in Durham is very indifferent. It cannot be roused into any sort of life. The strike in the Northumberland steam coal trade has produced no effect upon it, certainly not in the way of improved prices. The strike is wearing itself out. The men have no resources, and they will have to accept the reduction of 12½ per cent. upon their wages. It is almost certain that the pits will be at work by the middle of this week.

Coasting freights advanced about 2d. per ton last week. This was owing to the detention of small sailing vessels on their passage to the North. Steamers freights would have a corresponding rise. On account of the desire of steamers to get out to Odessa as soon as the blockade is raised, rates to the Mediterranean and Black Sea are low, £13 per keel only is paid steamers to carry coals to Odessa. The gas-works in Odessa, it is reported, have been quite out of coal for a long time, and the streets of the town have been nearly in darkness, so that the needs of the Gas

Company there are pretty considerable. More gas coals were shipped last week for Boston, U.S.; the freight was 5s. 6d. per ton.

Of course, in the unsettled condition of business last week very little manufacturing trade was entered upon. The chemical market was, if anything, flatter, but it is hoped, now that things look more settled in the East, and that there is a better tone of trade in America, the chemical business will rally a little. It has been in a very depressed condition over a considerable period. The state of the iron trade is unchanged, but there may be a considerable improvement within a month or two if peace be established. Manufacturers are clinging to that hope.

A large number of sailors got to sea last week—some 400 or 500, as a good few steamers took crews to the Mediterranean. The labour market has been cleared to that extent, and as most of the Northumberland miners will be at work, it is hoped in a few days the position of a large body of the working population will be much improved.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Sheriff of Dumbartonshire has now pronounced an interlocutor approving of the whole proceedings taken by the Police Commissioners of Kirkintilloch in regard to the adoption of the Burghs Gas Supply Act, and authorizing the registration of their minutes, on the subject, in the Sheriff Court books. The effect of this proceeding is that the Act is now finally adopted within the burgh, and that the Commissioners of Police are the statutory authority for carrying out its provisions.

At Burntisland the same steps have been taken in that burgh, and the Sheriff of Fifeshire has confirmed the act of the Town Council of Burntisland in respect of the Gas Act. In this case the existing works belong to the North British Railway Company.

The Directors of the Gas Company of Kilmalcolm, a rapidly rising village on the high-level line of railway leading from Glasgow to Greenock, and now becoming an important residential suburb of Glasgow, have reduced the price of gas from 9s. 9d. to 9s. 2d. per 1000 cubic feet; and a dividend of 3 per cent. has been declared for the financial year just expired. It is rumoured that the Glasgow and South-Western Railway Company have approached the Gas Company with a view to the purchase of the works and plant; but it is stated that as yet the negotiations have not been successful. With the view of providing additional street-lamps in the village, a public subscription is being raised.

At a meeting of the Glasgow Town Council last week, confirmation was given to a minute empowering the Gas Commissioners to sell, to the City Improvement Trustees, the property which was formerly the site of the Townhead Gas-Works, at the price of £35,794, entry to be had at Whitsunday next. There is at present under notice of motion, before the Gas Sub-Committee, on Works, a proposal to close the Partick Gas-Works as early as possible, and to dispose of the ground and materials.

In his report upon the quality of the Glasgow gas for the week ending the 2nd of February, Dr. Wallace reports that the minimum illuminating power ranged from 25·70 to 26·26 candles; the average from 26·06 to 27·05 candles; and the maximum from 26·39 to 27·71 candles.

At the usual meeting of the Edinburgh Town Council, held last Tuesday, there was submitted Mr. J. F. King's report on the analysis of the gas supplied to the city on the 28th of January. The gas of the Edinburgh Company was stated to possess an illuminating power of 28·30 standard candles, and that of the Leith Company stood at 27·50 candles. Mr. Somerville moved that, in view of the fact that the gas for the public lamps was taken from the pipes of both Companies, it be remitted to the Cleaning and Lighting Committee to consider the whole question of the gas supply. The motion was agreed to.

On the 1st inst. Glasgow Corporation Gas Nine per Cent. Annuities were 10s. higher, at 218-218½, and a small lot realized the advanced quotation.

The usual monthly meeting of the Dundee Water Commissioners was held last Thursday, when it was reported that, at a meeting of the Works Committee, held on the 31st ult., it was resolved to pay the contractors for the Lintrathen Water-Works the sum of £13,439 5s. 11d., being the balance due to them by the Commissioners.

On Saturday, the 2nd inst., the completion of an important new water supply scheme for the parish of New Cumnock, Ayrshire, was celebrated. The works were executed under the superintendence of Mr. Wyld, from the office of Messrs. A. and J. Leslie, of Edinburgh.

Owing to the prevalence of epidemic disease a short time ago in the town of Airdrie, the water with which that town, the neighbouring town of Coatbridge, and Langloan are supplied was suspected, and already Mr. Tatlock, of Glasgow, and Dr. Stevenson Macadam, of Edinburgh, have subjected it to analysis. Dr. Macadam says that though the waters cannot be regarded as the best for town use, yet they are a good average quality; and there is an absence of those unwholesome ingredients which confer noxious or unhealthy properties upon water. He is, therefore, of opinion that, at the time of his inspection, the water supply of the districts named was of wholesome character, and fitted for all domestic purposes, including drinking and the cooking of food.

The recent rapid advance in the price of pig iron in the Glasgow market culminated on Monday last, when a violent reaction set in, the highest prices reached being 52s. 4d. cash, and 52s. 5d. one month. A decline of 6d. per ton took place on Tuesday, and on the following day there was another decline of 5d. per ton, which was reduced to 4d. before the close, the total decline being 1s. 1d. from Monday's highest quotation, and the closing prices for the week being 51s. 2½d. cash, and 51s. 4d. one month. About 5000 tons changed hands on Monday forenoon at 51s. 2d. cash.

There has been an exceptional dulness in the Glasgow coal market during the past week, the result, to some extent, of the insufficiency of vessels in port, as well as the general want of confidence in political affairs. Prices are a shade easier. A good many of the coalmasters experience considerable difficulty in keeping their pits going.

PONTEFRACT GAS COMPANY.—The report of the Directors to be presented to the half-yearly meeting of Proprietors, on the 20th inst., states that the amount divisible amongst the Shareholders is £1300 17s. 11d., out of which they recommend the payment of a dividend for the six months ending Dec. 31 last, at the rate of 10 per cent. per annum. The whole of the plant is in an efficient state, and good working order.

CROFT GAS COMPANY.—The half-yearly meeting was held at Darlington, on the 4th inst.—Mr. G. J. Scurfield in the chair. The Directors reported a profit on the six months working of £184, which enabled them to recommend a dividend at the rate of 6 per cent. per annum. The affairs of the Company were progressing, and, during the period under review, an additional bench of retorts and a set of annular condensers and scrubbers had been erected.

STOCKTON AND MIDDLESBROUGH WATER COMPANY.—The half-yearly meeting of the Shareholders was held on the 5th inst.—Mr. H. Pease in the chair. The usual dividend was declared at the rate of 10 per cent. on the original and class A shares; 8 per cent. on class B and D shares; and 5 per cent. on the C and E preference shares. The Chairman stated, in answer to inquiries, that, when the purchase-money payable by the Corporations was received, it would be immediately distributed.

SALES OF PROVINCIAL GAS AND WATER SHARES.—Last week twenty £10 ten per cent. shares in the Belper Gas and Coke Company were put up for sale by auction, and realized £19 each; and six £5 shares in the same Company were sold at par, as were also twenty-eight £5 shares in the Matlock Water-Works Company. On the 1st inst. £120 consolidated stock in the Cambridge Water-Works Company was sold by auction, and realized £273; and at the same time 117 £2 shares in the same Company, upon which 10s. per share has been paid, sold for £265.

WHITWORTH VALE GAS COMPANY.—The report of the Directors shows that, though there was an increase during the last half year of thirty in the number of consumers, in gas-rental there was a decrease of £822 6s. 1d., as compared with the corresponding period of 1876, the figures being £2139 7s. 1d., as against £2961 13s. 2d. This decrease was, no doubt, owing to the short time being worked in the district, and the general depression in trade. Nevertheless the accounts show a profit of £913 8s. 7d. on the half-year's working, which, with a balance held over from the last half year, will allow a dividend at the rate of 10 per cent. per annum, and leave a considerable surplus to be carried to the next account.

REDUCTIONS IN THE PRICE OF GAS.—The Directors of the Worcester Gas Company have announced that on and after the 1st of July next the rate of reduction for prompt payment of accounts will be 9d., instead of 6d., per 1000 cubic feet, as at present. The Croft Gas Company have made a reduction of 6d. per 1000. At Chippenham the price is reduced from 4s. 7d. to 4s. 2d. The Directors of the Sleaford Company have determined to reduce their price from 5s. to 4s. 7d. on the 1st of April next. The Directors of the Sheppy Gas Company announce a reduction from 4s. 6d. to 4s. 3d. on and after the 1st of July, with a corresponding reduction on the charge for public lighting. The Dewsbury Town Council propose to make a reduction of 6d. per 1000 very shortly.

SHEERNESS PUBLIC LIGHTING.—The Local Board of Health for Sheerness having applied to the Sheppy Gas Company for a reduction in the charge made by them for the public lamps, the Secretary of the Company (Mr. A. W. Marks) has made the following reply, which was laid before a meeting of the Board on Thursday last:—

Gas Office, Feb. 6, 1878.

Gentlemen,—The Committee of Directors having reported the result of their recent interview with your General Purposes Committee, I am instructed by the Board of Directors of this Company to say that they have fully considered the representations then made, and they cannot find that any legitimate grounds were shown for the concession of a special rate of charge for gas supplied to the street-lamps. The principle of a uniform charge, both to public authorities and private consumers, is one which, so far as they can ascertain by inquiry, is not departed from in any place where the street-lamps are supplied by "average meters." As was explained to your Committee, the gross quantity of gas supplied to the public lamps is a quantity very disproportionate to that supplied under either of the special contracts of the Company.

The Directors have arranged, in the ordinary course of their business as defined by Act of Parliament, and as an additional incentive to the still more extended use of gas, to offer a further reduction in the price of gas from and after July next, in the shape of a discount for prompt payment, of 3d. off the present rate of 4s. 6d. per 1000 feet, throughout their district. In such reduction your Board will participate.

The principle for which your Committee contended, that some advantage in price should be granted in respect of the supply of the public lamps, is one which, in the estimation of the Directors, would involve an injustice to every private consumer, especially the larger ones. The conditions upon which the lamps are now supplied involve incidental risks, and well-ascertained losses, far in excess of the average in private consumption, so that the same gross rental from ordinary consumers, who are constantly increasing in number, is very much more profitable to the Company.

Under these circumstances, the Directors regret they cannot admit that any fair claim has yet been made out for an exceptional reduction in the price of gas supplied to the public lamps.

(Signed) A. W. MARKS, Secretary.

NEWPORT (MON.) GAS-WORKS BENEFIT SOCIETY.—The annual dinner was held on the 28th ult.—Mr. T. Canning, the Engineer of the Gas Company and the Treasurer of the Society, occupying the chair. In the course of the evening, responding to the toast of "Prosperity to the Society," the Chairman said the objects it contemplated were very simple indeed. About Midsummer, 1875, one of their poor fellows died in circumstances well known to them all. He would refer to them no further than to say it was the origin of the Society. They buried him in a very decent and proper manner. The day that he was buried this Society was born. He hoped the Society would improve by age. It had reached its third year successfully and prosperously. There was only one fact that he regretted to mention in connection with it. Since their first meeting in public they had lost two members who were with them then. The Society originated among themselves, was maintained by themselves, and was carried on entirely by themselves, and none but themselves interfered in any way whatever in its management. They had donations from the Directors of the Gas Company and others, and with that assistance they managed all the rest themselves. During the three years there had been £134 collected. Considering the small number of men, this was a strong testimony to their care and thrifty habits. During that time two members had died, two members wives had died, and two children; and these had been properly and decently interred. They had also aided a great many amongst them who had been sick. There was in the bank a balance of over £26 in their favour; and three dividends had been paid. It did not need anything more than these facts to testify to the success and fidelity of the Society. Some excellent speeches were made in the course of the evening, and a very agreeable entertainment appears to have been enjoyed.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

422.—EASTMURE, D. G., Kentish Town, London, "Improvement in the construction of ball-valves." Feb. 1, 1878.

433.—SIMON, L. and R., Nottingham, "Improvements in and connected with gas-engines." Feb. 1, 1878.

443.—LEE, J., Dublin, "Improvements in the manufacture of gas from wood, peat, or other vegetable substances, and in apparatus employed therefor." A communication. Feb. 2, 1878.

445.—LEESON, W. R., Bridgewater, Somerset, "An improvement in adjustable spanners or wrenches, also applicable as a nut-lock." Feb. 2, 1878.

451.—VAUGHAN, E. P. H., Chancery Lane, London, "Improvements in apparatus for raising water." A communication. Feb. 4, 1878.

453.—WEST, J., Maidstone, "Improvements in apparatus for charging gas-retorts." Feb. 4, 1878.

464.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in valves or apparatus for reducing or regulating pressure." A communication. Feb. 5, 1878.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2944.—FATHERS, J., Wales, Yorks, "Improvements in water, steam, air, and other similar valves or cocks, the said improvements having reference to the spindles, covers, and packing thereof." Aug. 1, 1877.

3011.—CONRADI, H., Golden Square, London, "An improved universal syphon pump." A communication. Aug. 8, 1877.

3051.—RICHARDIN, C. H., Paris, "Improvements in gaseliers and other pendent lights." Aug. 10, 1877.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS;
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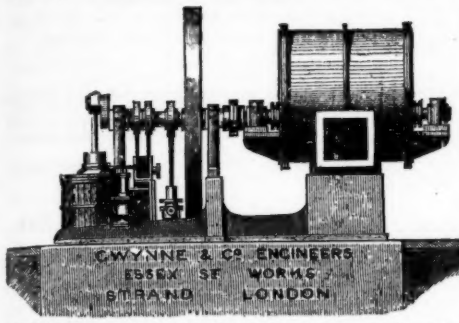

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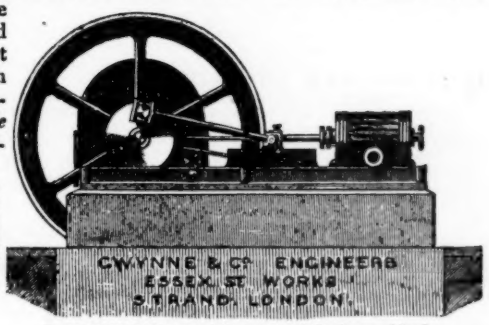

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WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas," &c.
Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, Two Second-hand Purifiers, 10 to 12 ft. square, with Connections. In good order.
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WANTED, by a practical Man, a situation as FOREMAN or WORKING MANAGER of Gas-Works. Good experience in erecting and management in all branches. Can be well recommended.
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WANTED, Orders for Samples to test the superior Silkstone, Wigan, and other Gas Coals and Cannel on Sale by G. J. EVESON, Gas Coal and Cannel Contractor, BIRMINGHAM.
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WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

GAS PURIFYING WOOD SIEVE MAKING.
AN experienced Man wants a re- engagement as FOREMAN of a Job in a Gas-Works.
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ON SALE—One Station-Meter, to pass 1000 cubic feet per hour. Almost new. Will be sold cheap.
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FOR SALE—Cast-iron Gasholder Tank, 31 ft. diameter by 15 ft. deep. Equal to new. Also Cast-iron SCRUBBER, 7 ft diameter, 20 ft. high, fitted with 12-in. Valves and Connections. In good condition.
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FOR SALE—A Telescopic Gasholder, 25 ft. by 10 ft. 6 in., in Brick Tank. Inner Lift new two years since, with new Guide Columns, Wheels and Carriages, Chains and Balance-Weights.
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For particulars, and order to view, apply to RICHARD HOLMES, Esq., Secretary, Gas Company, Arundel, SUSSEX.

TRAVELLER.
WANTED, a Gentleman, having a good connection among Gas Companies throughout the United Kingdom, for the SALE of OXIDE OF IRON.
Address, X 324, Messrs. Deacon's, 154, LEADENHALL STREET, E.C.

FOR SALE—Two 50-ft. Gasholders and Columns, &c.
One 52-ft. Wrought-iron TANK (above ground).
One STATION-METER, to pass 15,000 cubic feet per hour.
Twenty 15-in. Circular MOUTHPIECES.
Seventy feet of 14-in. HYDRAULIC MAIN, D-shaped.
The whole of the above are in good condition.
Apply to J. S. REEVES, Manager, Gas-Works, BILSTON.

THE Directors of the Hebden Bridge Gas Company have for SALE the following PLANT:
Four Purifiers, 8 ft. by 6 ft. by 3 ft., with Lifting Apparatus.
Hydraulic Centre-Valve, with 10-in. Connections.
One 8-in. Vertical Condenser, consisting of 16 Pipes, with Bridge Pipes.
One 7-in. Vertical Condenser, consisting of 7 Pipes, with Bridge Pipes.
One Cast-iron Scrubber, 12 ft. by 3 ft. 4 in. by 4 ft. 4 in.
One Station-Meter, with 7-in. Connections, Valves, and Bye-pass complete.
Particulars may be had from the undersigned,
JOHN U. BLACKBURN, Manager.
Gas-Works, Hebden Bridge, Feb. 6, 1878.

LEEDS CORPORATION GAS-WORKS.
TENDERS solicited for supply of New METERS (Wet and Dry) for ensuing Twelve months;
For supply of Clay RETORTS.
For purchase of Four Old GASHOLDERS.
For purchase of a quantity of Old BRICKS.
Further particulars, together with forms of tender, may be obtained on application to Mr. WOODALL, at the Gas-Works, Meadow Lane.
Tenders to be sent addressed to the Chairman of the Gas Committee, Gas-Offices, Boar Lane, not later than Wednesday, the 20th inst.
Leeds, Feb. 11, 1878.

MANCHESTER CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS & OTHERS.
THE Gas Committee will receive, on the 25th day of March next, TENDERS of CANNEL and COAL, for delivery at their Works, situated at Gaythorn and Rochdale Road, over a period of One or more years, from the 30th day of June next (tenders for Three or Five years will have the preference), and the Committee are now prepared to receive applications for permission to send in samples.
Sealed tenders, stating price and quantity proposed to be delivered at each Station, the rate and period of delivery, and endorsed "Tender for Cannel" or "Coal," as the case may be, must be addressed to the Chairman of the Gas Committee, and delivered at this Office on or before Monday, the 25th day of March next.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
JOSEPH HERON, Town Clerk.
Department, Town Hall, Jan. 30, 1878.

CONTRACT FOR GASHOLDER.
THE Police Commissioners of Inverness desire TENDERS for the construction of a Cast-iron TANK, of 71 ft. 6 in. diameter, and Telescopic GASHOLDER, in Two Lifts, each of 20 ft. depth, in terms of plan and specification, copies of which can be had on application to Mr. J. THOMSON, Manager of the Gas-Works, INVERNESS, on payment of One Guinea; and sealed tenders to be lodged with ALEXANDER DALLAS, Esq., Solicitor, Clerk to the Commissioners, on or before the 4th of March next.

TO IRONFOUNDERS & GASHOLDER MAKERS.
THE Morecambe Gas Company invite TENDERS for the construction of a Cast-iron TANK, 71 ft. 6 in. diameter by 17 ft. deep. Also for the erection of a Single-Lift GASHOLDER, 70 ft. diameter by 17 ft. deep, with Columns, Girders, &c., in accordance with drawings and specifications, to be seen at the Office of the Company, Market Street, Morecambe.
Sealed tenders to be sent in not later than Friday, Feb. 15, addressed James Tetley, Esq., Chairman, Gas-Works, Morecambe.
By order,
W. DUFF, Manager.

LYTHAM IMPROVEMENT COMMISSIONERS.
THE Gas-Works Committee are prepared to receive Designs and Tenders for supplying and erecting, at their Works, Lytham, Four 10-ft. square PURIFIERS, together with 10-in. Valve, and necessary Connections.
Sealed tenders, accompanied by designs, must be sent in to John Richardson, Esq., Chairman of the Gas Committee, on or before Tuesday, the 26th day of February, 1878.
Any further information may be obtained at my Office, Market Hall, Lytham.
By order of the Commissioners,
THOMAS BOWEN, Manager.
Gas-Works, Lytham, Feb. 8, 1878.

BOROUGH OF BURY.
THE Gas Committee of the Corporation are prepared to receive Drawings, Specifications, and Tenders, for a CONDENSER of the Vertical Annular type, with 20-in. diameter, Connections, Pipes, Valves, &c., fixed complete. Minimum capacity, 70,000 cubic feet per hour.
Particulars may be obtained from J. Cartwright, C.E., the Borough Surveyor.
Tenders to be sent in, addressed to the Chairman of the Committee, on or before the 12th day of March.
By order,
F. BULL, Town Clerk.
Corporation Offices, Bury, Feb. 6, 1878.

BOROUGH OF HALIFAX.

TO BRASS AND IRON FOUNDERS.
THE Gas-Works Committee of the Cor- poration are prepared to receive TENDERS for supplying Brass GAS COCKS and Wrought-iron TUBING for a period of Twelve months.
Forms of tender and any further information may be obtained on application to Mr. William Carr, Gas-Works Manager, Halifax; and tenders, properly endorsed, must be sent to me on or before Thursday, the 21st of February, 1878.
By order,
A. C. FOSTER, Town Clerk.
Town Hall, Halifax, Feb. 1, 1878.

THE BROMLEY GAS CONSUMERS COMPANY.

NOTICE is hereby given that the ORDINARY GENERAL MEETING of this Company will be held at the Bell Hotel, Bromley, Kent, on Thursday, the 28th day of February inst., at Six o'clock precisely, to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare a Dividend, and for general business.

By order of the Board,
GEORGE H. OSBORN, Secretary and Manager.
Offices at the Works, Brick Kiln Lane,
Bromley, Kent, Feb. 12, 1878.

THE MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

INCORPORATED BY ACT OF PARLIAMENT, 1867.

NOTICE is hereby given that the TWENTY-SECOND ORDINARY HALF-YEARLY GENERAL MEETING of the SHAREHOLDERS of this Company will be held in the Board-Room at the Works, Mitcham, in the County of Surrey, on TUESDAY, the 26th day of February, 1878, at Three o'clock in the afternoon precisely, to declare a Dividend for the half year ending the 31st day of December, 1877; to elect Two Directors, and One Auditor.

The Directors who retire by rotation at this Meeting are James Bridger and J. Poole Wagstaff, Esqs., who, being eligible, offer themselves for re-election.

The retiring Auditor is John Wade, Esq., who, being eligible, also offers himself for re-election.

The Transfer Books will be closed from the 11th to the 26th of February inst.

By order,
BENJAMIN GREEN, Secretary and Manager.
Board-Room, Mitcham, Surrey, Feb. 5, 1878.

THE Exeter Gaslight and Coke Company are prepared to receive TENDERS for the erection of a Telescopic GASHOLDER, about 115 ft. diameter, in Two Lifts, each about 25 ft. deep. Also for an Iron TANK, with all necessary excavations to receive same.

Plans and specifications may be seen on application to the Engineer, at the Basin Gas-Works, between the hours of Nine and One o'clock.

Separate and sealed tenders, marked "Tender for Gasholder," and "Tender for Tank," to be sent to me, the undersigned, on or before Saturday, Feb. 23.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
W. A. PADFIELD, Secretary.
Gaslight Offices, Exe Island, Exeter,
Feb. 7, 1878.

CITY OF CARLISLE.

THE Gas Committee of the Corporation of Carlisle are prepared to receive TENDERS for the construction of a Concrete TANK, about 124 ft. diameter by 30 ft. deep.

Plans and specifications may be seen at the Gas-Works on and after Feb. 4, 1878, and copies of the specification may be obtained on payment of One Guinea.

Sealed tenders, addressed to the "Chairman of the Gas and Water Committee," and endorsed "Tender for Tank," to be delivered at the Gas-Works not later than Feb. 14, 1878.

The lowest or any tender not necessarily accepted.

J. HEPWORTH, Engineer and Manager.
Gas-Works, Carlisle, Jan. 28, 1878.

TO BUILDERS, CAPITALISTS, AND OTHERS.
GOSWELL ROAD—FREEHOLD SITE.

THE Directors of The Gaslight and Coke Company are prepared to receive TENDERS for the purchase of the above PROPERTY, comprising 67,000 square feet, or thereabouts. A plan of the Property can be seen at the Company's Offices, 148, Goswell Road, on application to Mr. J. Johnson.

Tenders should be addressed to me on or before Thursday, the 14th prox., and endorsed "Tender for Land—Goswell Road."

The person whose tender is accepted will be required to deposit with the Company's Bankers the sum of £2000, but the Directors do not bind themselves to accept the highest or any tender.

By order,
JOHN ORWELL PHILLIPS, Secretary.
Chief Office, Horseferry Road,
Westminster, S.W., Jan., 1878.

Price 1s., on stout paper, in stiff paper cover,

ANALYSES OF SCOTCH COALS, CANNEL, SPLINT, SHALE, &c., USED in the MANUFACTURE of GAS. By WILLIAM WALLACE, Ph. D., F.R.S.E., F.C.S., &c., Public Analyst and Gas Examiner for the City of Glasgow.

LONDON:
WILLIAM B. KING, JOURNAL OF GAS LIGHTING Office,
11 BOLT COURT, FLEET STREET, E.C.

Second edition, just published, with Folding Plates, &c., 2s. 6d. (postage, 2d.),

COMMON SENSE for GAS USERS: A Catechism of Gas Lighting for Householders, Gas-Fitters, Millowners, Architects, Engineers, &c. By ROBERT WILSON, C.E., Author of "A Treatise on Steam Boilers." "All gas users will decidedly benefit, both in pocket and comfort, if they will avail themselves of Mr. Wilson's counsels."—*Engineering.* "Mr. Wilson's book is thoroughly admirable."—*Engineer.*
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T. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

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THE
GAS COMPANIES EXPENDITURE JOURNAL,
Being a Ruled Account-Book with Printed Headings, and Analyzing Guide for Keeping, upon the easiest and most correct method, the Expenditure of a Gas Company, in accordance with the provisions of the Gas-Works Clauses Act of 1871, and suitable for all Companies.

Published by EDWARD SANDELL, Accountant, 2, Great George Street, WESTMINSTER, and W. B. KING, Office of the JOURNAL OF GAS LIGHTING, 11, Bolt Court, FLEET STREET, E.C.

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Associate of the Society of Accountants in England, Publisher of the
"Gas Companies Expenditure Journal,"
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No. 2, GT. GEORGE STREET, WESTMINSTER.

TO GAS ENGINEERS, MANAGERS, &c.

HILL and CO., Gas Engineers and Architects, 11, Appach Road, BRIXTON RISE, S.W., prepare Designs for the construction of New Gas-Works, Bridges, and Roofs, or for the remodelling and extension of existing Works. Also provide Drawings of all kinds of Gas Apparatus and Plant. Drawings, Tracings, and Specifications copied for Engineers and Contractors.

REMOVAL.

CHARLES HEISCH, F.C.S., Analytical and Consulting Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

Mr. ROBERT DEMPSTER, Sen.,
CONSULTING GAS ENGINEER,
Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,
ELLAND, near HALIFAX,
May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

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Manufacture and Distribution
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For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

NOTICE.
THE GAS & WATER COMPANIES DIRECTORY,
1878.
(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,
8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

THE THAMES BANK IRON COMPANY,
(Successors to LYNCH WHITE,)

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CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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FUEL-MACHINE, for Compressing Breeze and Tar.

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COMMON METERS.

The terms "Common" and "Ordinary," as applied to Wet Meters, include all of the *non*-compensating class. Minor differences of construction still leave *in all* one point of similarity—the *drum is a variable measure because the water is of variable level.* The absence of "Compensating" arrangements constitute the instrument a "Common Meter"—an "Ordinary Meter."

In such Meters the range of water-line determines the range of error, the former being kept *inconveniently* small to prevent the latter being *illegally* large. Frequent "watering" is necessary for the gas buyer's supply, and for the gas seller's protection.

In comparing such Meters with Dry Meters, it is truly urged that their possible error is only *five per cent.*, while in Dry Meters it is *unlimited;* and in comparing them with Wet Meters of the "Compensating" class, reference is made with equally good reason to their freedom from the complication and uncertainties of such Meters, and their usually less cost.

But however favourably the Common Meter may compare with Dry or Compensating Wet Meters, the fact remains undisputed—that it is an imperfect, variable, and (on account of its short range of water-line) often a troublesome instrument.

Its use by sellers of gas, now that the

WARNER AND COWAN METER

has not only extended the range of water-line, but abolished the range of error, can only be due to their not having had the merits of *that Meter* fully brought under their notice, or, perhaps, the undue importance they attach to its slightly increased cost.

The WARNER AND COWAN METER is as simple as the simplest of Common Meters, the only difference of construction being in the DRUM, which is a DEFINITE, not a variable measure. Lowering the water does not increase, nor raising it lessen the capacity; hence "watering" is viewed without suspicion by the buyer, and without anxiety by the seller of gas. The only interest either has in the operation is, that the valve be kept open for the supply, and here the advantages of the longer range must be manifest to all.

The additional price (which is 10 per cent. on the sizes most used) is surely unimportant, in view of the advantages obtained. Suppose £1000 be expended on "Common" Wet Meters; for about £100 more, "WARNER AND COWAN" could be obtained, the interest on which £100 (being only £5) is too limited a sum to consider when the alternatives are—the "Common" Meter with all its imperfections, "Compensating" Meters with all their complications, and Dry Meters with all their uncertainties.

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For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

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All negotiations respecting M. Brémond's patented process for preventing Deposits of
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in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 22, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Gas-Works, VERSAILLES, near Paris, who may be consulted upon all matters connected with the Gas Industry.

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These Fire-Bricks have been used in the erection of Glass Furnaces for Thirty years, and have beaten all others; they do not contract or expand.
SMALL SAMPLE BOX SENT FREE OF COST.

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Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
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THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
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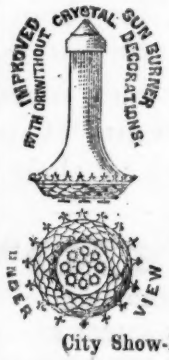

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Of every description.
Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.
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PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.

A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

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ELLIS LEVER & CO., Central Coal Offices, 46, Cannon Street, London, E.C., and 6, Piccadilly, Manchester, are prepared to contract for the supply of THE BEST CLASSES of CANNEL and GAS COAL, for long or short periods. Analysis and prices on application.

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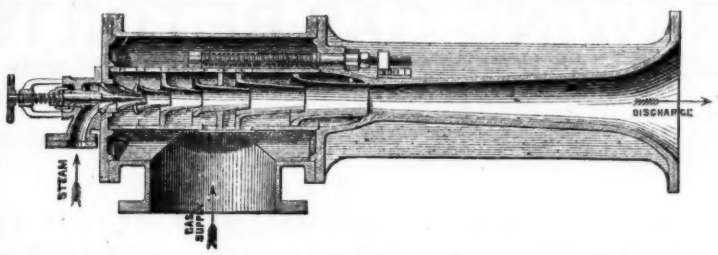

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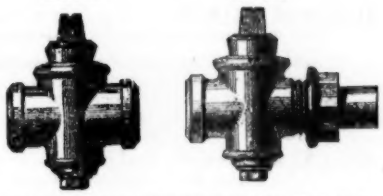
CAST-IRON GAS-MAIN COCKS,

WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:

SHORT STREET, LAMBETH, LONDON.

SLUICE VALVES.

The STRONGEST, CHEAPEST, & BEST in the TRADE.

HYDRANTS.

The Largest Variety of Improved Designs in the Market.

SPECIALITIES.

SLUICE VALVES for Water.
DO. for Gas and Sewage, 1½ to 48 in.
RESERVOIR SLUICES
AIR VALVES.
REFLUX VALVES.
BALL VALVES.
Compound HYDRANTS
Straight-way Do.
Screw-down Do.
Ball Do.
Sluice-Valve Do.
STAND POSTS, various.
STREET WELLS.
STAND PIPES.
PATENT FIRE COCKS
STAND PIPES & JETS.
HOSE UNIONS and REELS.
LEATHER & CANVAS HOSE.
SCREW COCKS and FERRULES.

Tested with 600 to 1000 feet head of pressure.

J. BLAKEBOROUGH & SONS,

COMMERCIAL BRASS AND IRON WORKS, } BRIGHOUSE,
WOODHOUSE IRON WORKS, } YORKSHIRE.

Contractors to the British and Indian Governments.

LONDON OFFICE:

5, WESTMINSTER CHAMBERS, VICTORIA ST., S.W.,

Where Samples may be seen.

LIVESEY'S PATENT WASHER.

This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It has been in successful constant use for nearly three years, does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention.

For Particulars and Prices apply to

Messrs. DEMPSTER AND SONS, ELLAND, HALIFAX, for the North;

Messrs. BAILEY, PEGG, AND CO., Bankside, LONDON, S.E., for the South;

Messrs. WILLEY AND CO., Commercial Road, EXETER, for West of England and South Wales;

Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

Important to Gas Companies and Large Consumers of Paint.

SILICATE PAINTS are now used by the Principal Governments, many of the Gas, Railway, Shipping, and Manufacturing Companies throughout the world. These Goods possess the following great advantages over ordinary Paints:—

Unaffected by Sulphuretted Hydrogen Gas.
Better Colour and Greater Durability.
Non-Poisonous—almost inodorous.
Nearly 50 per cent. Cheaper; 1 cwt. having nearly equal Covering Power of 2 cwt. of Common Paint.
Withstand extremes of Heat that destroy Ordinary Paint.
Practically Indestructible.
No Chemical Action on Metals.
Prevent and arrest Corrosion of Iron.
Do not Soften by Immersion.

SILICATE ENAMEL PAINT is sold ready for use. One coat equal to two of ordinary Paint, and two of varnish. Dries hard, with a beautiful glossy surface, rendering varnish unnecessary. Shields iron from corrosion. No chemical action on metals. Suitable for iron or wood work. May be applied over Tar.

GAS COMPANIES and other **Large Consumers**, who heretofore have used ordinary Paints, are advised to give the Silicate manufactures a trial. By doing so they would find that their annual expenditure for Paint and labour very much reduced, and better quality secured. The use of Silicate Paints reduces the outlay for labour by at least one-half, as fewer coats are necessary, and the work done lasts double the time.

Price Lists, Pattern Cards, and other Information on application to the Sole Manufacturers,

THE SILICATE PAINT COMPANY,

LIVERPOOL: 30 AND 32, SEEL STREET. LONDON: 107, CANNON STREET.

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

WILLEY & COMPANY,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

London Agent for Gas-Retorts: D. W. OGG, 3, Jeffrey's Square, St. Mary's Axe, E.C.

" " Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

THE

STANDARD WASHER AND SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]

Some of the advantages claimed for this Apparatus are as follow:—

The Exposing of a large Amount of Effectually-wetted Surface (which is continually reproduced) to act upon the Gas.
Unerring Regularity in the Distribution of the Liquor.
Saving of Expense in Providing and Exchanging Scrubbing Material—none being required.
Economy of Space, thus enabling the Apparatus to be protected from the Weather.
Economy of First Cost and of Maintenance.
It works without Pressure.
It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

Applications for Prices, &c., to be made to

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,
148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,
SOLE AGENT FOR
THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

E. & W. H. HALEY,

General Ironfounders and Makers
OF
CAST-IRON GAS AND WATER PIPES.
Sizes 1½ to 15 inches.

LISTER HILLS FOUNDRY, BRADFORD, YORKSHIRE.

GAS PURIFICATION.

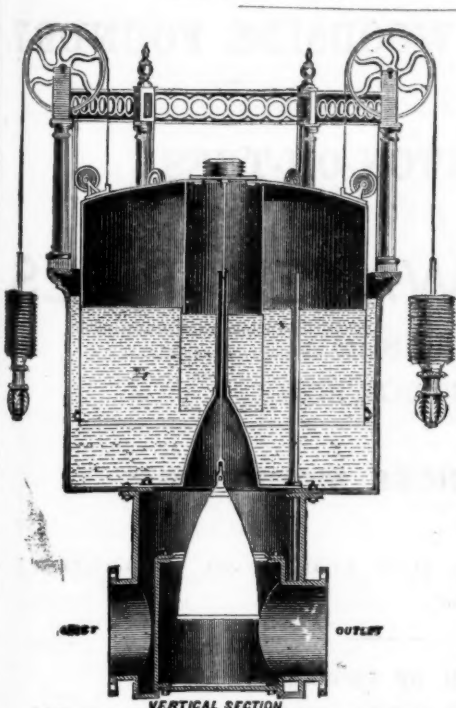
BAILES & HALLSWORTH,
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS
BY THEIR
PATENT HYDRATED PEROXIDE OF IRON MATERIAL.

The Material is adapted specially for taking up sulphuretted hydrogen, and will simultaneously absorb any ammonia that may pass the scrubbers.
The spent oxide resulting from our Material is more valuable than that from natural oxide of iron, and manufacturing chemists buy it in preference.
The Material has now been in use during the past three years in most of the principal Gas-Works in Yorkshire and elsewhere.
It contains considerably less moisture than natural oxide of iron, and is much cheaper and more efficient as a purifying agent.
B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.
FOR SAMPLES AND TERMS, ADDRESS—
BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY. LEEDS.

J. & J. BRADDOCK,

GLOBE METER-WORKS,
OLDHAM
Beg to submit to Gas Engineers their
PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL
Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL
Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL
Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

WILSON CARTER & PEARSON,
GAS COAL AND CANNEL FACTORS,
Supply to any Railway Station or export Best Wigan Arley Gas Coal and Nuts; best qualities of the Derbyshire, Yorkshire, and North Staffordshire Gas Coals and Nuts; also the best descriptions of Lancashire, Welsh, Scotch, and other Cannel.
Messrs. WILSON CARTER & PEARSON, being contractors to several of the principal Gas Companies in the Midland Counties, have pleasure in being enabled to give them as references.
Chief Offices: Temple Buildings, 50, New Street, Birmingham.
London Offices: 6, Great Winchester St. Buildings, E.C.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

GRIRDROD'S PATENT
PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.
In use at the chief gas-works, and giving great satisfaction.
For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,
Brassfounders, Gauge Injector and Tool Makers,
ALBION WORKS, SALFORD,
LANCASHIRE.

JOHN ABBOT & CO., LIMITED,

MANUFACTURERS OF

IMPROVED

HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

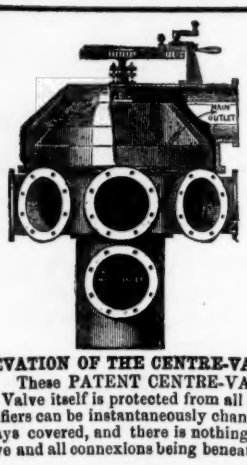
HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

GAS PLANT GENERALLY, PIPES, ROOFING, TANKS, &c.,

PARK WORKS, GATESHEAD.

LONDON OFFICES: 2, SUFFOLK LANE, CANNON STREET, E.C. | GLASGOW OFFICES: 54, ST. ENOCH'S SQUARE.

C. & W. WALKERS'
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.

PLAN OF THE VALVE.

PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS. DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

THOMAS ALLAN & SONS,

IRONFOUNDERS.

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 10 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 15s. from Glasgow.

AGENTS FOR LONDON AND THE SOUTH OF ENGLAND:

THE THAMES BANK IRON COMPANY, UPPER GROUND STREET, LONDON, S.E.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

HYDRATED PURIFYING MATERIAL.

Samples on application.

MESSRS. SPENCE BROS., LIMITED,

Will be glad to supply the above on the most favourable terms.

PRICES ON APPLICATION.

ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

VICTORIA CHEMICAL WORKS, BRADFORD, NEAR MANCHESTER.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

CROLL'S
DRY GAS-METERS,

PRIZE MEDALS.
LONDON, 1851;
NEW YORK, 1853
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS.
LONDON 1862;
DUBLIN, 1865;
PARIS, 1867

THE GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON, N.E.

TO DIRECTORS OF GAS COMPANIES, GAS ENGINEERS, AND MANAGERS OF GAS-WORKS.

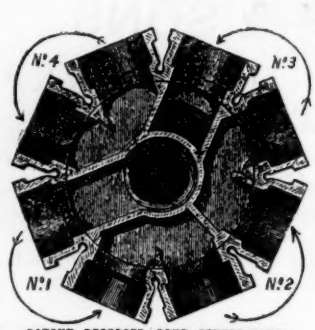
GENTLEMEN,—We beg to remind you that this is the time when all orders of any magnitude for Fire-Clay Gas-Retorts, and all kinds of Fire-Clay Goods likely to be required during next season, should be given out.

In reply to some scandalous reports that have been raised respecting our firm, we take this opportunity of saying that we have been established as the largest makers in the trade for over thirty years; that we are now in a better position than ever to supply our customers; and that, for quality of material, workmanship, and endurance, our goods are equal or superior to any produced. Soliciting your favours, we are, Gentlemen, your obedient Servants,

HARRIS AND PEARSON.

Illustrated Catalogues and Price Lists, or Special Quotation (on receipt of specification), sent free to any part of the World. Also quotations for Cast-Iron Pipes, Wrought-Iron and Lead Tubing. Manufacturers of all kinds of Sanitary Tubes and Blue Staffordshire Bricks of every description.

ADDRESS—HARRIS AND PEARSON, STOURBRIDGE.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.

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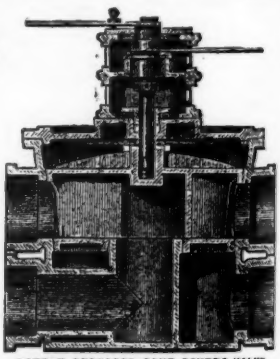
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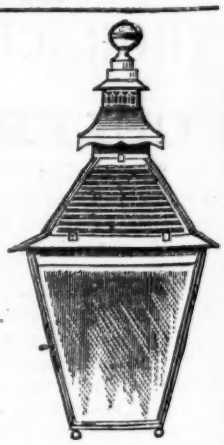

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